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Full Length Research Paper

Evaluating the quality characteristics of kunun produced from dry-milled sorghum

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Kunun is a traditional beverage in Nigeria produced by wet milling from sorghum, maize or millet. This work evaluates kunun produced from dry-milled sorghum flour. The sorghum was dehulled, milled and sieved to obtain flour. The flour was steeped for 24 h and mixed with spices to produce kunun and the quality of the resultant kunun was compared with that of kunun manufactured by the wet-milling process. With dry-milling process, the yield of kunun was 80% while the yield from the wet-milling process was 60%. Titratable acidity was lower in kunun samples prepared from dry-milled sorghum (0.40%) than in the kunun manufactured by wet milling (0.55%). The pH and total soluble solid of kunun prepared from dry milled sorghum were higher (5.10 and 14.82, respectively) than kunun from wet milling process (4.12 and 13.42, respectively). Protein content recorded for dry milled sample was 5.55% and that of wet milled sample was 4.20%. Crude fibre content was also assessed to be 0.25% for dry milled sample and 0.45% for wet milled sample. Kunun samples from wet milling process were preferred to those from dry milling process. Microbial counts indicate that both samples were free from feacal contamination. Total viable count for kunun samples prepared from dry milling process was 1.0 x 10^4, and for wet milled sample total viable count was 1.6 x 10^4.

Key words: Kunun, sorghum, dry-milling, wet-milling.

INTRODUCTION

Kunun or kunun zaki (depending on the cereal used) is a popular cereal based, non-alcoholic beverage. It is a locally fermented sweetened non-alcoholic beverage that is widely consumed in most parts of Northern Nigeria especially during the dry season (Adeyemi and Umar, 1994). Kunun is a refreshing drink taken as a substitute for soft drinks. It is a staple beverage drink that is relatively cheap and nutritious when compared to carbonated drinks. The gross composition of kunun has been discussed by Ayo et al. (2003). Depending on cereal availability; sorghum, maize millet and rice are commonly used for the traditional production of kunun. Spices such as ginger, black pepper, red pepper and cloves are commonly added as flavour and taste improver. Sugar is also added to act as sweetener (Ahmed et al., 2003).

The traditional production of kunun is still of village technology level. The traditional process of manufacture involves wet milling of cereal grains with spices (ginger, cloves, red and black pepper), wet sieving, partial gelatinization of the slurry, sugar addition and bottling. In its traditional manufacture, the basic processes are not standardized and the level of ingredients such as spices and sweetener are not quantified. Furthermore, a wide variation exists in the method of preparation depending on the taste and cultural habits, which partly explains the lack of consistency in product quality (Adeyemi and Umar, 1994).

Ahmed et al. (2003) have been able to investigate the effect of extrusion on the sensory attributes of extruded cereal – legumes blends for instant kunun zaki beverage analogues. Effect of spices on the microbial and sensory quality on the product had been investigated. These tests revealed that spices produce strong flavours that are advantages are in the improvement of food flavours. The component of spices had been evaluated to have antimicrobial effect on kunun – zaki drink. Spices had been revealed to have more potent components that are capable of destroying microbes (Ayo et al., 2003). In this work, efforts were made to prepare and evaluate the quality of kunnu made from dry milled sorghum with spices. Comparative evaluation of the quality of kunnu from dry and wet milled samples was also conducted.

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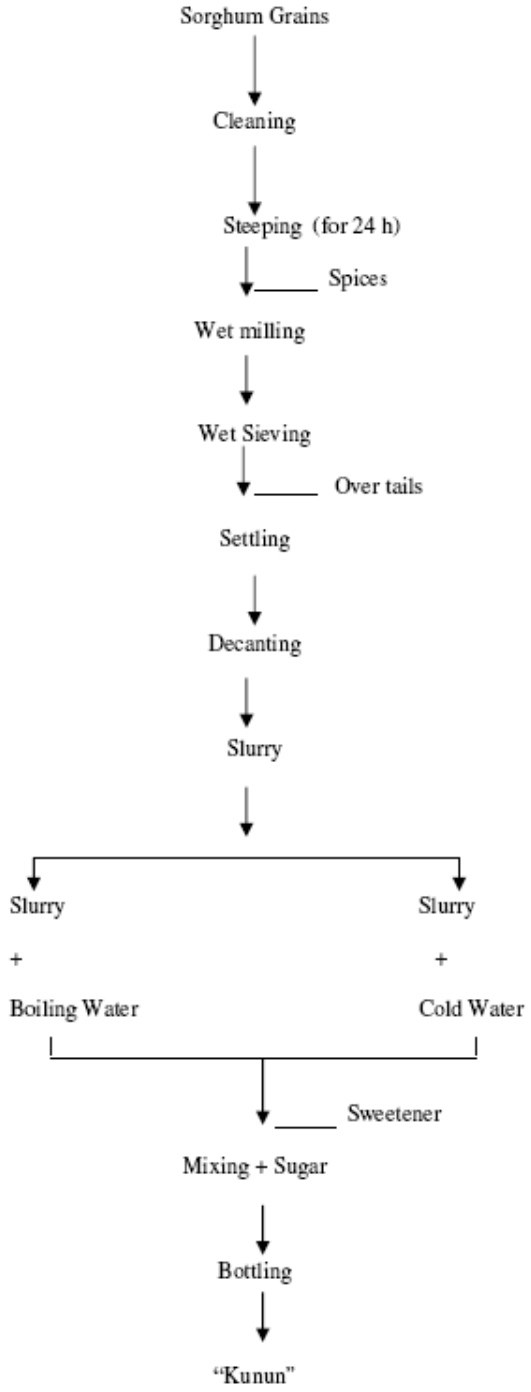

Figure 1. Flowchart for the production of kunun drinks by wet milling methods.

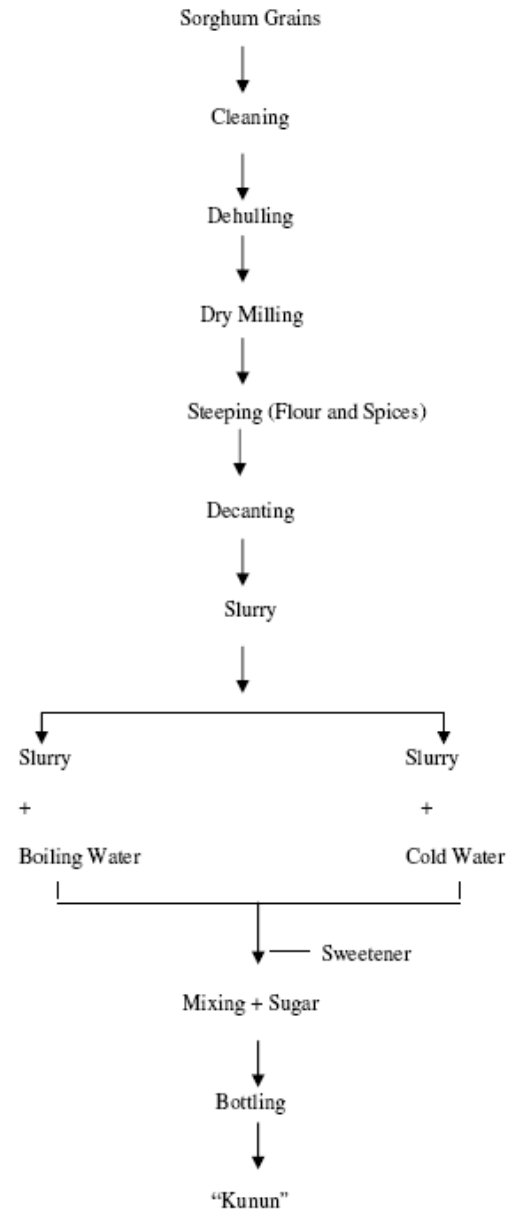

Figure 2. Flowchart for the production of kunun drinks by dry milling methods.

MATERIALS AND METHOD

Preparation of kunun beverage by wet milling method

Sorghum grains, spices (ginger, hot chilli powder and cloves) and sugar were procured from a local market in Ogbomoso, Oyo state. The method of preparation followed was a modification of that of traditional method (Figure 1). About 500 g of thoroughly washed sorghum grains were soaked in 1 litre of water at room temperature. The soaked grains was washed and milled with spices. About 2.5 litres of water was later added and the slurry was sieved using a muslin cloth. The filtrate was divided into two parts. Boiling water was added to one part and cold water to the other. The two were mixed together and granulated sugar was added to the mixture. It was then distilled into sterilized bottles, sealed with covers and labeled appropriately. They were kept in the refrigerator for further analysis.

Preparation of kunun from dry milled Sorghum

As shown in Figure 2, about 500 g of sorghum grains were tempered with moisture and then dehulled in the Engelberg rice mill. The dehulled grains and spices were dried in a convection air oven at 50°C for 24 h. The endosperm and spices were milled separately into a powdered form. About 2 litres of water was added

Table 1. Physicochemical properties of kunun produced from dry and wet milling methods.

Samples	Kunun prepared by dry milling	Kunun prepared by wet milling
pH	5.10 ± 0.02	4.12 ± 0.02
Total soluble solid (%)	14.82 ± 0.03	13.42 ± 0.03
Titratable acidity (g citric acid) (%)	0.40 ± 0.03	0.55 ± 0.03
Specific gravity	1.09 ± 0.03	1.09 ± 0.02

Mean values of triplicate determinations.

Table 2. Proximate Composition of kunun from both dry and wet milling methods.

Samples	Dry-milled kunun (%)	Wet-milled kunun (%)
Protein (%)	5.55±0.02	4.20±0.05
Ash (%)	2.30±0.01	2.10±0.04
Crude fiber (%)	0.25±0.02	0.45±0.02
Moisture content (%)	86.62±0.03	85.42±0.03
Sugar (%)	13.30±0.03	13.25±0.02

Mean values of triplicate determinations.

to the sorghum flour and powdered spices, before steeping overnight. Supernatant was decanted to get the slurry. Then boiling water was added to the slurry; it was allowed to cool before granulated sugar was added. The product was dispensed into sterilized bottles, sealed with covers and appropriately labeled. They were then stored in refrigerator until further analyzed.

Analyses

pH, specific gravity, fibre, ash, the protein content and titratable acidity of the samples were determined according to the methods of AOAC (1990). The total viable count was enumerated by the pour plate as described by ICMSF (1978). A panel of 20, comprising of students and staff members from different departments in LAUTECH, were used to carry out the sensory evaluation of kunun drink prepared from dry and wet-milling methods. The panelists were of good health and are familiar with the taste, flavour, spiceness, mouth feel, sweetness and other quality attributes of kunun drink. The ranking method of Ihekoronye and Ngoddy (1985) was employed. The samples were coded with alphabets A and B, and served chilled in sensory evaluation cups. Using a 9 point hedonic scale, numerical scores were assigned to the rating with 1 representing “like extremely” 5 representing “neither like nor dislike” and 9 representing “dislike extremely”. The use of t-test in preference tests was employed to determine the significant preference amongst the samples.

RESULTS AND DISCUSSION

Table 1 showed that pH of the wet milled kunun sample was lower than that of dry milled sample. The acidity of kunun beverage is as a result of lactic acid production during fermentation (Ashiru et al., 2003). The titratable acidity of the wet-milled sample was higher than that of dry milled kunun sample. This could be due to the activities of lactic acid bacteria. It is likely that the dehulling of the grains during the preparation of sorghum flour reduced the microbial load that should be responsible for the natural fermentation during steeping (Adeyemi, 1983). Total soluble solid in the wet-milled kunun sample was lower than that of dry-milled kunun sample. This could be due to the fact that there was greater loss of slurry during the wet milling of sorghum grains and spices.

The results from Table 2 showed that there was greater loss of protein for kunun sample prepared by wet milling method. The reduction in protein content may occur during steeping of grains, wet milling and wet sieving processes. There was increase in the ash contents of the flour. An increase in the ash content is implying an increase in the mineral content. The crude fiber of the wet-milled kunun sample was higher than that of dry-milled kunun sample. Dehulling and milling of sorghum grains had been shown to reduce the crude fibre content of the flour (Adeyemi, 1983).

The results of microbiological analysis are presented in Table 3. The total viable count for wet milled sample is 1.6×10^4 cfu and for dry-milled sample it is 1.0×10^4 cfu. This might be due to the slight fermentation the wet-milled kunun sample was exposed to during the steeping of grains before wet milling. Dry-milled kunun sample had lower viable bacteria counts, due to the fact that bacteria, which may be responsible for natural fermentation, might have been lost with the hull during dehulling (Adeyemi, 1983). It is evident from Table 3, that both samples were free from coliform and feacal coliform. The samples were free of contamination because the added spices components have antimicrobial effect and are capable of destroying pathogenic bacteria (Ayo et al., 2003).

Table 3. Microbial load of the kunun samples.

Samples	Dry-milled kunun	Wet-milled kunun
Total coliform count (cfu/ml)	NG	NG
Total feacal coliform count (cfu/ml)	NG	NG
Total viable count	1.0×10^4	1.6×10^4

NG: No growth.

Sensory evaluation analysis indicates that there is significant difference amongst the kunun samples. Panelists indicate that the wet milled kunun samples were more acceptable than dry milled samples. However, the kunun prepared from the dry milled sorghum appeared to retain most of the nutrient content in terms of protein and minerals.

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