

EVALUATION OF THE NUTRITIONAL QUALITY OF TIGER NUT MILK

By

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ABSTRACT

Tiger nut is a good source of Vitamins and Minerals, which can be eaten as raw nut or milled so as to extract the milk and other useful nutrients in it. In this work, Laboratory standard procedures for food analysis of Association of Official Analytical Chemists (AOAC) were followed to determine the proximate composition of tiger nut milk (obtained from Yellow and brown varieties of tiger nut) The following nutritional parameters were assessed: Moisture content, ash content, Lipid content, crude protein, and Carbohydrate. Yellow samples had the following values: moisture content 81.88%, ash content 3.00%, crude protein 2.54%, lipid content 38.00%, and carbohydrate 56.46%. Brown samples had the following values: moisture content 83.09%, ash content 2.50%, crude protein 2.54%, lipid content 20.5% and carbohydrate content 74.46%. Sensory properties such as Colour/Appearance, Aroma, taste, mouth feel, texture, consistency, and general acceptability was carried out. The following results were obtained; 90% of the panelists accepted the mouth feel of Brown sample as against 80% of the Yellow sample, where as for the texture both samples were equally accepted; as regards the aroma 90% accepted the Brown sample while 80% maintained that of the Yellow sample, 80% went for the taste of the Brown sample while 70% accepted the taste of the Yellow sample, the consistency of 80% was accepted for Brown sample while 90% accepted the consistency of the Yellow sample, for the appearance the acceptability of the Brown samples was 10% lesser than the Yellow sample and General acceptability for Brown sample was 90% while for Yellow sample was 70%.

Keywords: Tiger nut, Milk, Aroma, Texture, Ash content, Variety

INTRODUCTION

Agricultural products have over the years been underexploited in the regions of which they are produced especially in the developing countries. One of these agricultural products with high emerging level of use is the Tigernut (*Cyperus esculentus L*) which belongs to the division–*Magnoliophyta*, class*liliopsida*, order – *cyperales* and family–*cyperaceae*. It is used in making cookies, locally made beverages (*Kunnu, Horchata*), used as bio-fuel, as well as consumed as snacks (especially when dried). Tiger nut was found to be a good substitute for cereal grains (Abodunrin and Belewu, 2008). The nut which is cultivated throughout the world are found in America, Northern part of Nigeria and other West African Countries like Guinea, Ivory Coast, Cameroon, Senegal, and other parts of the world. It was found to be a cosmopolitan perennial crop of the same genus as the papyrus plant. Other names of the plant are earth almond as well as yellow nut grass (The Columbia Electronic Encyclopedia, 2004). The nut has been cultivated since early times (chiefly in south Europe & West Africa) for its small tuberous rhizomes which are

eaten raw or roasted, used as hog feed or pressed for its juice to make a beverage. Non-drying oil (usually called chufa) is equally obtained from the rhizome. In West Africa, the plant is gathered from the wild while it is a troublesome weed in planted field in the United States (The Columbia Electronic Encyclopedia, 2004). The nut was found to be rich in myristic acid, oleic acid and linoleic acid (Eteshola and Oraedu, 1996).

It is otherwise known as *Ofo* in south western part of the Nigeria, *Aya* amongst the *Hausas* and *Aki-Hausa* amongst the *Igbos*; it is used as close substitute for milk in patients intolerable to lactose; as a nutritional supplement as well as being recognized for its growing use as fish baits.

Tiger nut is also said to be a good source of crude fibre which is said to reduce the rate of diseases since it is not easily and totally digestible by the acid and enzymes in the alimentary canal (digestive tract) of animals as well as human beings.

Belewu and Belewu (2007) reported that Tiger nut helps in preventing heart attacks, thrombosis; activates blood circulation and also helps in preventing cancer, due to high content of soluble glucose. It was also found to assist in reducing the risk of colon cancer (Anonymous, 2005). Very high fiber content combined with a delicious taste makes tiger nut ideal for healthy eating, since crude fibre is said to reduce the rate of diseases as it is not easily and totally digestible by the acid and enzymes in the alimentary canal (digestive tract) of animals as well as human beings (Belewu, 2007). The nut is rich in energy content (starch, fat, sugars & protein), Minerals (phosphorus, potassium) and Vitamins E and C (Abodunrin and Belewu, 2008 in Sanful, 2009). Tiger nut reduces the risk of colon cancer and it is suitable for diabetic persons and also helps in losing weight (Beniwal, 2004). Tiger nut was equally reported to have high content of oleic acid with positive effect on cholesterol level due to high content of vitamin E. The nut was found to be ideal for children, older persons and sportsmen (Martinez, 2003). The inclusion of 33.33% of tiger nut in the diet of cockerel starters was reported by Bamgbose *et al.* (2003). It exists in the market as a milk variety of plant origin put forward as alternatives to liquid milk of animal origin for food. It has also been asserted that these products provide a nutritional value comparable to that of milk of animal origin but without providing cholesterol and that they avoid the appearance of problems associated with intolerance of lactose and some proteins of cow milk. Most milk of plant origin are made of soya beans and involves several disadvantages such as anti nutritional factors, a reduction of their nutritive value as a result of heat treatment at high temperatures and/or repeated heat treatment, unpleasant flavours e.t.c. It is these disadvantages that give tiger nut milk an edge over other milks from plant source.

Over the years, Tiger nut has been one of the agricultural products underutilized especially in the developing countries like Nigeria, where it abounds in large quantities. The prevalence of obesity and the high level of diet related health conditions have generated a lot of concern about our dietary intake and its effect on our health. The need to make more informed choices regarding food preferences among the people cannot be overemphasized. In the light of these problems, the tiger nut has been recognized as one of the best nutritional crops that can be used to augment the diet (Afenu, 2008). The tiger nut crop is one of the cash crops, which is not given due recognition and patronage possibly because many people do not know its nutritional benefits. They also have excellent nutritional qualities with a fat composition similar to olive plant and have a rich

mineral content, especially phosphorus and potassium. Tiger nuts are also gluten and cholesterol-free, and have very low sodium content; also high price of imported milk and milk products coupled with poor milk production in Nigeria in particular and Africa in general seem to have made consumers more ready to accept milk produced from plant sources hence the need to embark on this study.

The quality parameters to be determined in this study are limited to the following; Crude protein, Carbohydrates, Lipid content, Ash and Moisture Content, while the sensory properties of the Tiger nut milk to be determined are Colour/Appearance, Aroma, taste, mouth feel, texture, consistency, and general acceptability.

MATERIALS AND METHODS

Fresh samples of Tiger nuts, yellow and brown species were bought from the Minna Ultra-Modern market, Niger state, Nigeria. The nuts were properly picked, washed and soaked for about 30 minutes in distilled water. 6 liters of distilled water was added to 1kg each of both samples of the tiger nuts and blended several times with a blender and then filtered with the aid of a muslin cloth. The filtrate was kept in plastic bottles and refrigerated. The samples were analyzed for Crude protein, Lipid content, Ash, Moisture content and Carbohydrates using the official methods of the Association of Official Analytical Chemists (A.O.A.C., 1980).

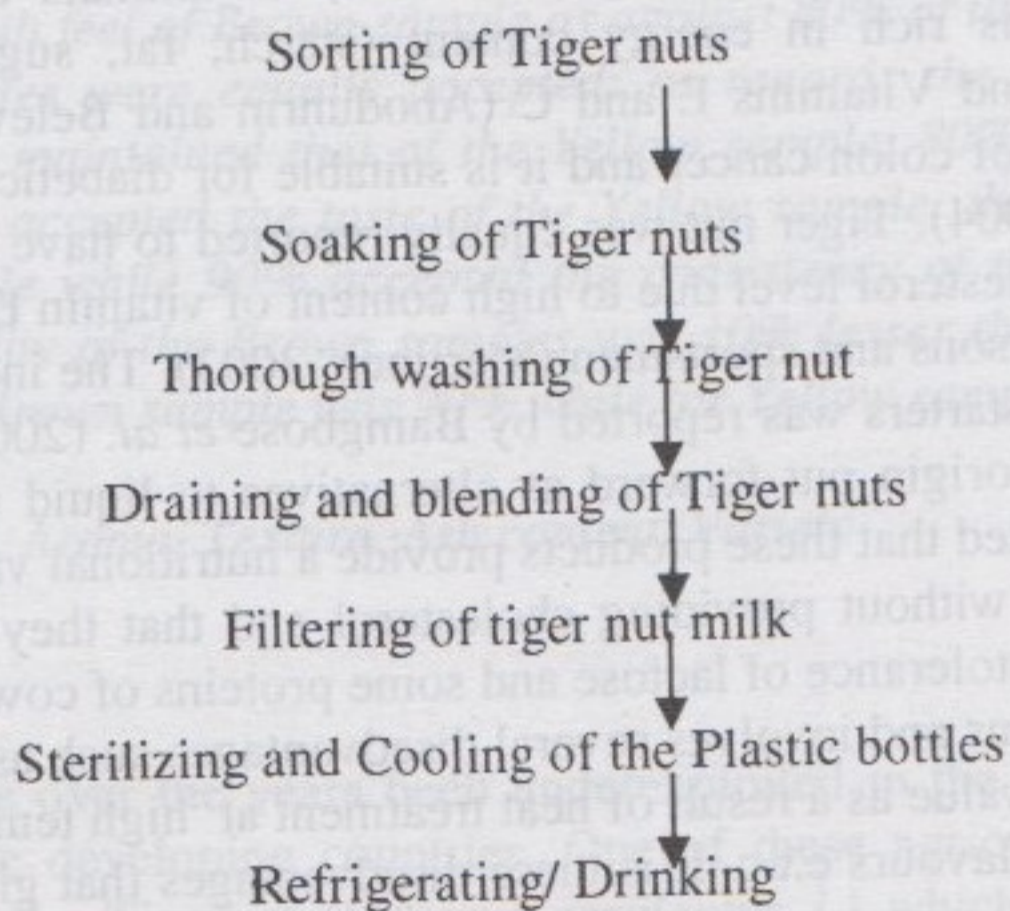


Figure 1: Flow chart for the preparation of tiger nut milk

RESULTS AND DISCUSSION

Table 1 below shows the results obtained from the tests carried out on the Tiger nut samples.

Table 1: Proximate Analysis of Tiger nut Milk Samples.

Composition%	Yellow			Brown		
	Replicates 1	Replicates 2	Replicates 3	Replicates 1	Replicates 2	Replicates 3
Moisture content	81.38	79.78	82.17	83.36	81.73	84.18
Ash content	2.95	3.01	3.04	2.53	2.51	2.46
Crude Protein	2.55	2.57	2.50	2.55	2.54	2.53
Lipid content	37.38	38.12	38.50	20.16	20.57	20.77
Carbohydrate	56.65	55.53	57.20	73.24	75.44	74.70

Table 2: Average Proximate Analysis of Tiger nut Milk samples

Composition%	Yellow (average)	Brown (average)
Moisture content	81.11±1.22	83.09±1.25
Ash content	3.00±0.05	2.50±0.04
Crude protein	2.54±0.04	2.54 ±0.04
Lipid content	38.00±0.57	20.50±0.31
Carbohydrate	56.46±0.85	74.46±1.12

Table 3: Percentage score on comparative sensory evaluation of Tiger nut milk

	Mouth Feel	Texture	Aroma	Taste	Consistency	Appearance	General Acceptability
Brown Sample	90	80	90	80	80	80	90
Yellow Sample	80	80	80	70	90	90	70

From the results (Table 2), the Tiger nut milk samples have indeed shown that it has great potentials in terms of its usefulness for the benefit of mankind. A comparison shows that the Brown sample has a higher value of carbohydrate (74.46%) than the Yellow sample (54.46) and this makes it more acceptable. These values are higher than the carbohydrate contents of some milk and thus justify its use as a closer and better substitute for people in need of energy (sport men and women) and the development of the infant brain by the galactose content of tiger nut milk. The Yellow sample has a higher percentage of lipid content (38.00%) and this signifies that it produces more oil on compression when compared to the Brown sample. Hence, it is economical to use the Yellow sample for the purpose of oil extraction since it will save cost, time

and energy. Once digested and absorbed, lipids help the bodies absorb certain Vitamin. Also lipid stored in the body cushions vital organs and protects us from extreme cold and heat.

Table 2 shows that both samples have equal amount of protein (2.54%) and thus are both recommended because protein which is composed of long chain of amino acids play an essential roles in the cells of all living creatures- they serve as building blocks of cells, control chemical reaction and transport materials to and from cells.

Yellow sample has a higher ash content of (3.00%) which serves as a better source of minerals like calcium, phosphorous etc. for strong bones and teeth in human beings. The Brown sample has higher moisture content of (83.09) than the Yellow sample (81.11%), but are both accepted because the recommended moisture in milk ranges from 80-90% (FAO, 1968). This makes tiger nut milk succulent and refreshing and can be incorporated between meals.

The proximate composition of Tiger nuts milk when compared to the nutritional value from (FAO, 1968), shows that it has nutritional values that meet up with standard milk requirements, but due to ignorance of these facts, the awareness on tiger nut milk's potential as a source of milk is still poor.

The mouth feel of the Tiger nut milk is an important factor for consumers, 90% of the 10 panelists as shown in Table 3 above, who participated in the sensory evaluation, indicated their acceptance of the mouth feel of the Brown milk sample while 80% accepted the mouth feel of the Yellow milk sample.

The texture quality is also an important factor to consumers. 80% accepted the texture of Brown and Yellow Samples.

The aroma of the milk sample is important to the consumer. 80% of the panelists accepted the aroma of the Yellow milk sample as against 90% of the Brown sample.

The taste of the milk is also an important factor for the consumers, of the 10 panelists, 80% accepted the taste of the Brown milk sample while 70% accepted the taste of the Yellow sample. The appearance is important to consumers. 90% of the panelists accepted the appearance of the Yellow milk sample as against 80% of the panelists that accept the appearance of the Brown milk sample.

The consistency of the milk, that is how light or heavy the milk is, is an important factor for the consumer. 90% of the panelists accepted the consistency of the Yellow sample as against 80% of the Panelists.

The general acceptability of the milk sample is very important to the consumers. 90% of the panelists found the Brown milk sample very acceptable while 80% of the panelists found the Yellow sample very acceptable. There seem to be a slight preference for the Brown milk sample. The results showed that although the texture, aroma, appearance, consistency were important for the Panelists, mouth feel and taste were more important for overall acceptance of the milk

samples. The mouth feel of the Brown milk sample was more acceptable than the mouth feel of the Yellow sample. Also the taste of the Brown milk sample was more acceptable to the panelists than that of the yellow sample.

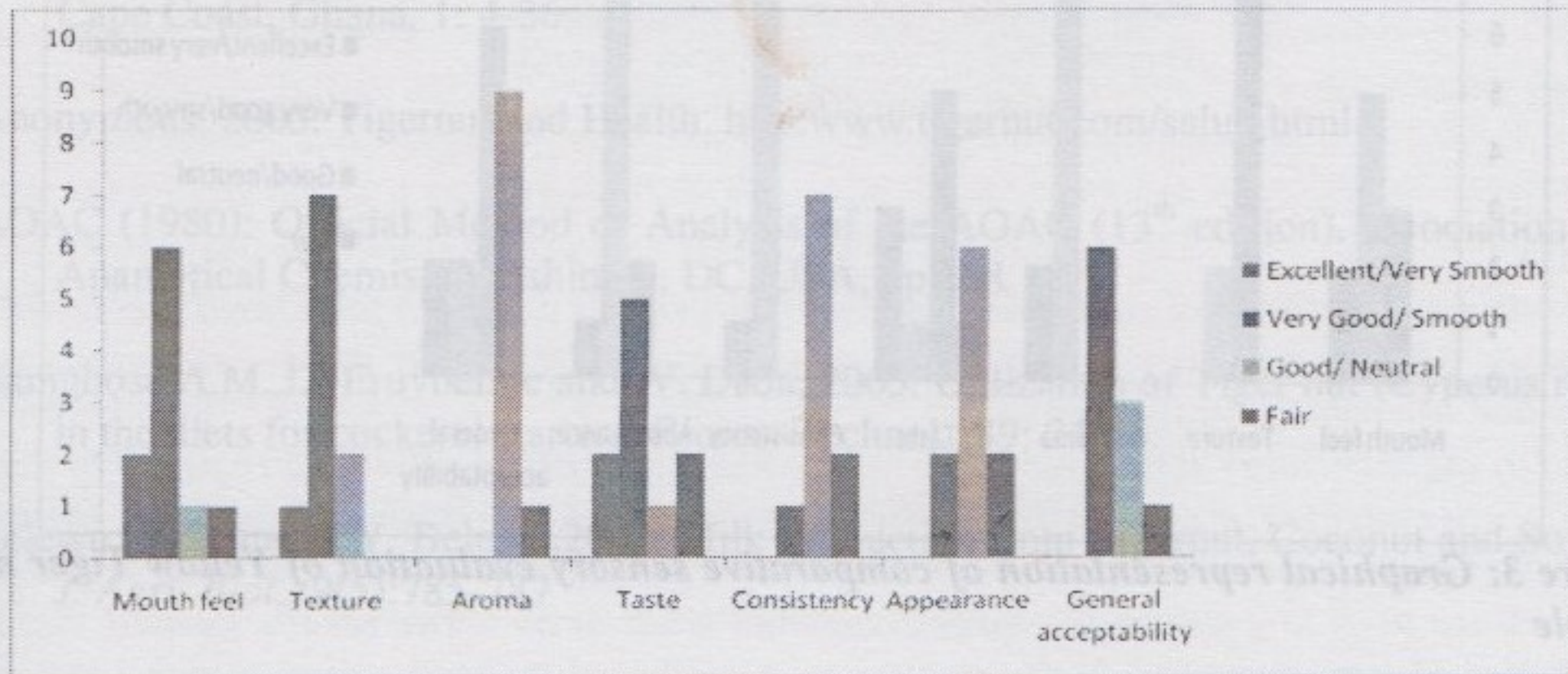


Figure 2: Graphical representation of comparative sensory evaluation of Brown Tiger nut milk sample

From Figure 2 above, the vertical axis represent the 10 panelists while the horizontal axis represents the sensory properties of Brown Tiger nut milk sample used. 2 panelists described the mouth feel as excellent, 6 panelists said it is very good and 1 each went for good and fair. 1 of the panelists accepted the texture of the brown sample to be very smooth, seven described the texture as smooth and 2 went for neutral. 9 of the panelists described the aroma as good and 1 described it fair. 2 of the panelists accepted the taste as excellent, 5 described the taste as very good, 1 panelist described the taste as good and 2 panelists said the taste is fair. 1 of the panelist accepted the consistency as very good, 7 describe the consistency as good and 2 said the consistency is fair. 2 of the panelists described the appearance of the Brown sample as very good, 6 said the appearance is good and 2 described the appearance as fair. 6 of the panelists accepted the Brown sample as very good, 3 described it acceptability as good and 1 described it acceptability as fair.

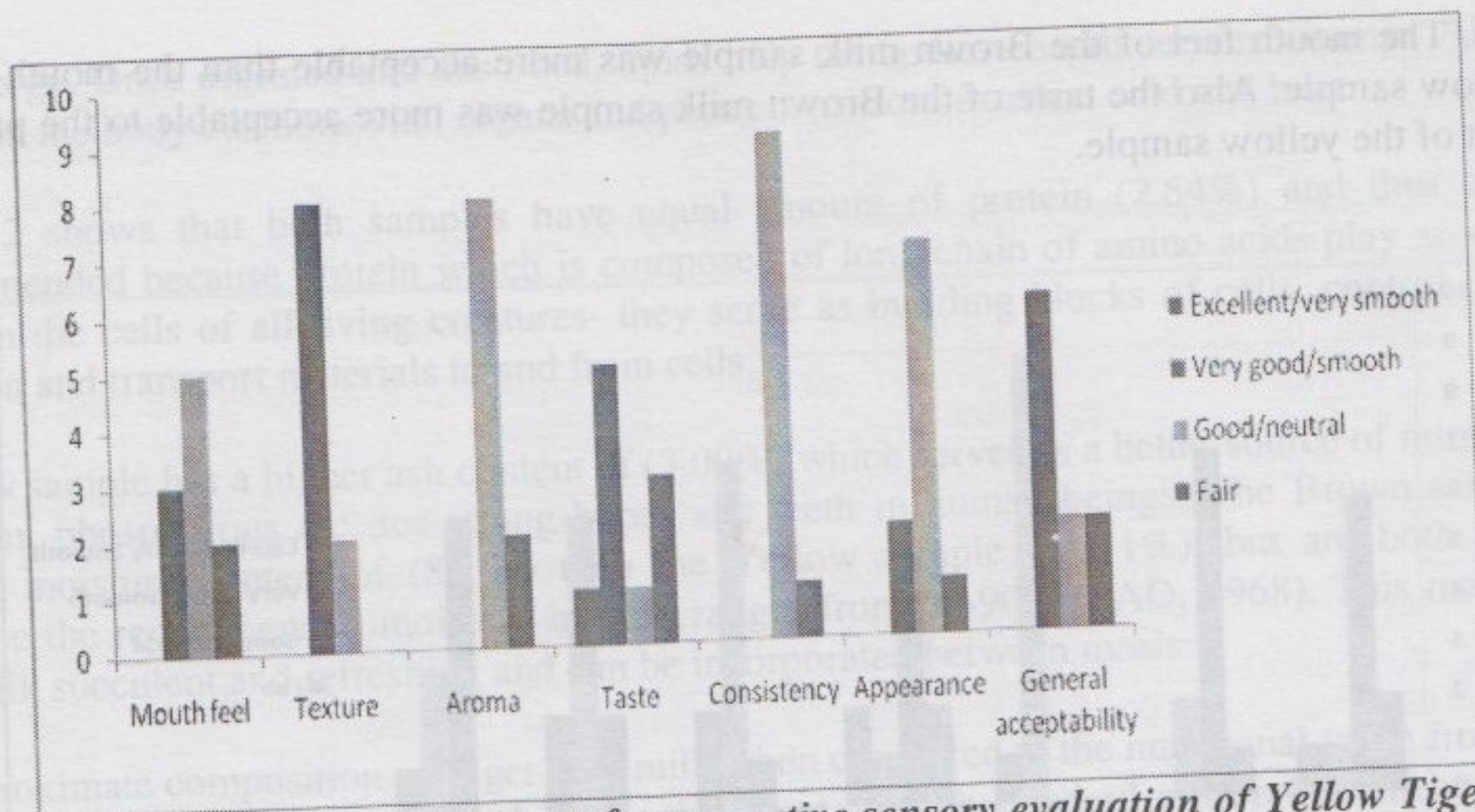


Figure 3: Graphical representation of comparative sensory evaluation of Yellow Tiger nut milk sample

From Figure 3 above, the vertical axis represent the 10 panelists while the horizontal axis represents the sensory properties of Yellow Tiger nut milk sample used. 3 panelists described the mouth feel as very good, 5 panelists said it is very good and 2 panelists went for fair. 8 of the panelists accepted the texture of the Yellow sample to be very smooth and 2 described the texture as neutral. 8 of the panelists described the aroma as good and 2 described the aroma as fair. 1 of the panelists accepted the taste as excellent, 5 described the taste as very good, 1 panelist described the taste as good and 3 panelists said the taste is fair. 9 of the panelists accepted the consistency as good and 1 said the consistency is fair. 2 of the panelists described the appearance of the Yellow sample as very good, 7 said the appearance is good and 1 panelist described the appearance as fair. 6 of the panelists accepted the Brown sample as very good, 2 described its acceptability as good and 2 described it acceptability as fair.

CONCLUSIONS

The aim of this study was to access and analyse the quality parameters of Tiger nut milk and also to carry out Sensory evaluation of Tiger milk. From the analysis, the results showed that Tiger nut milk has great potentials in terms of its usefulness for the benefit of mankind.

