ARGUMENTS SUPPORTING KEFIR MARKETING TO THE LOW-INCOME URBAN AFRICAN POPULATION IN SOUTH AFRICA

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Low-income urban African communities in South Africa constitute a market for low-cost products. Although urbanised, these communities' traditional rural food consumption behaviour is often still present, and this includes large volumes of sour milk or Maas. The low-income urban African is, however, deprived of this product due to numerous factors, resulting in nutritional shortages in the diet. Therefore, the demand exists in low income urban African communities for a low-cost fermented milk product with high nutritional value that is safe to consume and that is comparable in taste to traditional Maas. Kefir, a fermented milk product of Russian origin, has the ability to satisfy these needs.

1. INTRODUCTION

The ultimate objective of economic activity is the satisfaction of human needs, therefore, the nature of such needs will direct economic activity. Food consumption behaviour should, for instance, provide important guidelines for food production, marketing activities and government intervention.

Accepting that a consumer market segment is determined by *inter alia* income and food tradition and subsequent consumer tastes and preferences, it is clear that different income and cultural groups fall into different market segments. The low-income urban African consumer market is unique in its characteristics and needs, and consequently the dairy consumption behaviour of this market warrants special attention.

Commercial dairy products in South Africa have traditionally been developed and produced for sophisticated and affluent consumers. Both the price and the technology (including processing, packaging, storage and distribution) make these products unsuited to the majority of South Africa's population with their extremely low purchasing power and their specific living conditions. For this market, low cost products have to be produced with the help of low cost technologies. According to Bachmann (1987), the

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characteristics of low cost products include the following: manufacturing with relatively simple equipment; good shelf-life under natural climatic conditions; no need for expensive packaging; the provision of essential nutritional elements; and complementation to the traditional local diet.

Several factors deprive the low-income urban consumer market of their traditional fermented milk drink, Maas. Kefir, a fermented milk drink of Russian origin, has certain properties that make it suitable for this market, as well as conforming to Bachmann's (1987) definition for a low cost product. In this article the case for Kefir marketing to the low-income urban African population in South Africa is argued.

2. DAIRY PRODUCT CONSUMPTION BEHAVIOUR

2.1 On the rural scene

Milk is a favourite foodstuff in all traditional southern African cultures (Coetzee, 1982). Although milk is a nutritious product, it spoils quickly and it is generally recognised that after 5 – 6 hours raw milk will sour or start fermenting (Marshall, 1987). The lack of refrigeration and hygienic facilities forced the rural African population to keep milk in its least perishable form, namely as curd. It is, therefore, not surprising that many communities acquired a taste for "sour milk" and that, with time, techniques were developed to ensure that the process of souring (fermentation) followed a particular traditional pattern (Tamime & Robinson, 1988).

Spontaneously fermented milk is the most common dairy product in Africa. In rural African communities it is an old tradition that herders milk the cows during the course of the day, and when the wooden milking pails are full (which could take several hours), the milk is poured into calabashes or leather milk sacks to curdle.

Traditional Maas (*Amasi* in Zulu and Xhosa and *Mafi* in Sotho) was and still is made in clay pots and calabashes. The calabashes have wooden stoppers and whey is drawn off through a hole in the bottom of the calabash (Coetzee, 1982). The basic method is still a batch add-and-withdraw technique and milk is periodically added to the containers. The bacteria on the surface of the containers serve as the starter culture for the traditionally produced Maas (Keller & Jordaan, 1990).

Africans use Maas as a whole meal or as part of a meal for breakfast, lunch or dinner (Joubert & De Lange, 1992). The creamy fraction of Maas separates into lumps of a cheesy mass called "*Ingqaka*" and when Maas is ready for consumption, it is either drunk as it is or mixed with maize meal crumbs ("*Umphokoqo*"). When mixed together with "*Umphokoqo*" the dish is called "*Umvubo*" or "African salad". A recent food consumption study conducted in the rural areas of Eastern Cape province revealed an average consumption of 1.4 litres of Maas per day per adult equivalent (Nomakaya, 1999).

An important consequence of the traditional use of "sour" milk by Africans was the evolutionary development of the phenomenon of lactose intolerance. Lactose intolerance is the inability of individuals to digest the lactose in milk, which is due to a lack of the enzyme ß-D-galactosidase (Buttriss, 1997). It is estimated that 70% of adult Africans in Africa have this deficiency. In South Africa, an estimated 87% of Zulu, 65% of Sotho, 82% of Xhosa and 86% of Shangaan have a low concentration of ß-D-galactosidase (Joubert & De Lange, 1992). Such lactose intolerant individuals experience gastrointestinal symptoms when consuming fresh milk and then as a result tend to avoid milk and other dairy products. This has important implications for the dairy industry as well as for human nutrition. Milk is an excellent source of calcium and other nutrients such as vitamin B_{12}, riboflavin and phosphorus, as well as some of the essential amino acids. A high proportion of lactose-intolerant individuals are, therefore, malnourished, especially with regard to calcium, and a relationship between lactase deficiency and osteoporosis has been reported (Shah, 1993). People who are lactose-intolerant are, however, able to drink fermented milks due to the presence of microbial β-galactosidase and subsequent lower lactose levels (Shanani & Chandan, 1979; Shah, 1993; Buttriss, 1997).

2.2 On the urban scene

The abolition of apartheid legislation has resulted in an abnormally high rate of urbanisation, especially amongst the African population. Mass urbanisation over the past twelve years, in particular of low-income households from the rural areas of the former homelands, has caused enormous instant urban residential areas, mainly in the form of squatter areas and informal settlements in and around almost every town and city in South African (Myburgh, 1999). An estimated 1 million people are urbanised per year in South Africa (Britz, 1999) and today approximately half of South African Africans live in cities (more than 15 million people according to the 1996 census). In an era of insufficient economic growth, this rapid urbanisation has led to high urban unemployment and subsequently the establishment of large communities of urban poor.

There can be no doubt that these urban poor communities are vulnerable to food insecurity. According to a recent study (Cress-Williams, 2001) it was reported that undernutrition is a significant problem in Africa as it has been estimated that about 32% of the children on this continent are undernourished (Torun & Chew, 1994). It was also reported that 22.9% of 6 to 71 month old children in South Africa are stunted (Health Systems Trust, 1998; SAVACG, 1996). The more recent findings (Labadarios, 2000) of the National Food Consumption Survey indicated that this figure has neither improved nor deteriorated. It has also been predicted (Garret & Ruel, 1999) that food insecurity will increasingly become a pressing problem in urban areas. A study by Bourne *et al.* (1993) found a high level of food insecurity in the urban African population of the Cape Flats. They showed that, for example, the mean intake of vitamins and minerals reflected a nutritionally depleted diet . This diet insecurity could easily be solved with an adequate dairy intake.

Rural traditions and culture regarding food consumption are still present among many urban low-income African communities. High population density and geographic and economic vulnerability of these communities results in the preservation of many facets of this culture and traditions (Myburgh, 1995). However, due to several constraints, urban low-income communities are often unable to follow their traditional diet.

One of the direct outcomes of the urbanisation process is that unpasteurised milk is not as freely available as in rural areas for use in the traditional production of Maas. Legislation now stipulates that raw (unpasteurised) milk or raw cream may not be sold unless it is to be used for further processing (Anon., 1997). The production of Maas is not considered as "further processing" (Viall, 1999). Local authorities may apply to be listed to allow the sale of raw milk in their areas if they can control the safety of the raw milk but, in many cases, this is highly unlikely. According to legislation, the herds of cattle farmers who wish to sell unpasteurised milk must be certified annually by a veterinarian to be free of tuberculosis and brucellosis and the farmers must register with their local authorities. Farmers who sell unpasteurised milk are legally obliged to have their milk tested regularly for the presence of antibiotics or other antimicrobial substances, pathogenic organisms, coliform bacteria, *Escherichia coli*, somatic cells as well as the viable bacterial count (Anon., 1997).

In informal settlements there are individuals with their own cows who, regardless of legislation, still sell unpasteurised milk or Maas, without any proper certification, to their local communities. These small farmers usually have small herds (3 - 19 cows per farmer) that they often keep in their backyards in residential areas or give free wander in the informal settlements, which in itself creates an environmental health problem. The milking is done by hand twice a day, the product sieved through a 'clean' cloth and poured into 25 litre plastic or stainless steel containers. Cooling facilities are a problem and the temperature of the milk may vary between 10° and 35°C. The bulk of the milk is sold 'as is' for household use and the rest is 'soured' to produce traditional Maas. Customers supply their own containers and the product is scooped from the 25 litre holding tanks (Schrader, 2000). Concern is generally expressed over health, hygiene and environmental hazards resulting from this practice, and not without reason.

A study, conducted by the Cape Metropolitan Council into the quality of Maas produced by 35 small farmers within informal settlements in the metropolis, revealed a viable microbial cell count of more than 5×10^4 cfu. ml^{-1} in 25 (30%) of the 84 samples tested. Seventy-eight (93%) of the samples contained more than 20 coliforms per ml and 32% of the samples tested positive for presence of *E. coli* (Schrader, 2000). These results clearly indicate that there is reason for concern regarding the health risks in selling this type of Maas to low-income urban communities. According to legislation "raw milk that has become sour" may not be sold when it gives a standard plate count of more than 5×10^4 cfu.ml^{-1} of the product, if it contains more than 20 coliform bacteria per ml or if it is found to contain any *E. coli* in 1 ml of fluid (Anon., 1997).

Africans that belong to the lower income group and who live in informal settlements and rural areas are prevented from buying commercial Maas and fresh milk for the following reasons: the absence of refrigeration in their dwellings and *spaza* shops; extremely low disposable income; early departure time of workers from their homes to the workplace and late arrival from their workplace; shortage in transport facilities; and a lack of proper distribution of fresh milk in African townships (Myburgh, 1995). Commercial Maas is also a poor equivalent of the traditional variety as it contains colourants, thickeners and preservatives (Berry, 1999). These factors lead to a situation where urban, low-income African consumers are distanced from a highly nutritional traditional product.

With urbanisation, the consumption of dairy products by Africans has decreased substantially and this has had certain impacts on the nutritional status of low-income urban Africans. The BRISK study, conducted in the Cape Peninsula in 1994 to evaluate the dietary intake pattern amongst the urban African population (Bourne *et al*., 1994), revealed a low milk intake of less than 200 ml per adult per day. The recommended milk intake per adult per day is 400 ml, which is required in order to meet calcium needs. This quantity provides 476 mg calcium or just over half the recommended dietary allowance (RDA) of 800 mg for an adult per day (the balance coming from the rest of the diet). The intake of other dairy products was negligible. As much as 42% of the subjects consulted during the study reported consuming no dairy products during a 24 h recall period. Inadequate milk consumption by urban Africans was reflected by a too low intake of micronutrients such as calcium, zinc and riboflavin, and low levels of riboflavin in the blood, which can again lead to nutrition-related diseases (Langenhoven *et al.*, 1995).

3. A PROBLEM AND OPPORTUNITY IDENTIFIED

Low-income urban African consumers are prevented from making their own traditional Maas, while the quality of the traditional Maas they can purchase in urban areas is questionable and may pose a serious health risk. They are unable or do not want to buy commercial Maas and abstain from consuming non-fermented milk products due to a high level of lactose intolerance. The result is a too low intake of dairy products, followed by nutritional deficiency diseases. Such a situation would certainly threaten food security in low-income urban settlements.

There is thus a demand for a low cost fermented milk product with high nutritional value that is safe to consume and that is comparable in taste to traditional Maas among low-income urban African communities. A product that satisfies these needs, is Kefir.

4. WHAT IS KEFIR?

Kefir is a traditional fermented milk that originated in the Caucasian Mountains in Russia (Duitschaever, 1989) and is commonly manufactured by fermenting milk with Kefir grains (Kwak *et al.*, 1996). These grains have a structure similar to tiny florets of cauliflower, which may vary in size from 0.3 to 3.5 cm in diameter and contains several organisms that co-exist in a symbiotic association. These organisms are responsible for a lactic acid-alcoholic fermentation which gives Kefir its typical flavour that can be described as mildly alcoholic, yeasty-sour, with a tangy effervescence (Liu & Moon, 1983; Duitschaever, 1989; Pintado *et al.*, 1996; Garrote *et al.*, 1998). The grains are formed during the process of making Kefir and as far as is known, only from existing grains (Steinkraus, 1996). These grains are generally known to the public in South Africa as a “joghurtplantjie” (yoghurt plant) (Keller & Jordaan, 1990).

Kefir is still manufactured in Russia and Europe under a variety of names, such as Kephir, Kiaphur, Kefer, Kepi and Kippi (Kwak *et al.*, 1996). It is also popular in Eastern European countries and is produced in small quantities in Czechoslovakia, Poland, Sweden, Finland as well as in Germany, Greece, Austria, Brazil and Israel (Koroleva, 1988; Libudzisz & Piatkiewicz, 1990). It is currently available in the United States and its popularity is growing in Japan (Saloff-Coste, 1996). Numerous overseas companies sell Kefir grains over the Internet (Anon., 2000). Neither Kefir, nor Kefir grains are as yet marketed in South Africa, creating an excellent opportunity to launch these products locally.

5. CHARACTERISTICS THAT MAKE KEFIR SUITABLE FOR THE LOW-INCOME URBAN AFRICAN MARKET

5.1 Ease of preparation

Kefir is sufficiently easy to produce at home. It requires no more facilities than is normally found in a low-income family's kitchen. Approximately 18 g of Kefir grains are placed in 1 litre of milk in a clean container (Schoevers, 2000). This mixture is then incubated at room temperature for approximately 24 h or until the desired consistency is reached. The Kefir is strained through a clean sieve or cloth into a bowl to retrieve the Kefir grains, which can immediately be used to ferment the next batch of milk or be stored in a cool place (Schoevers, 2000).

Kefir can be made using milk with 3.2, 2.5, 1.0% (m/v) or no fat (Koroleva, 1988). The milk can be obtained from ewes, goats, mares or cows (Kneifel & Mayer, 1991) and either raw or pasteurised milk can be used (Marshall, 1993). This is a particularly important feature in favour of Kefir, as high-quality traditional Maas cannot be produced from pasteurised milk. If pasteurised milk is used to produce Maas, putrefication sets in before fermentation (due to the loss of natural lactic acid bacteria), resulting in a product with a putrid taste and aroma. If one considers that health authorities discourage the sale of unpasteurised milk, making it almost impossible for urban Africans to obtain, Kefir manufacture has a differential advantage over Maas. Kefir can even be made using UHT-treated milk or powdered milk (Merin & Rosenthal, 1986).

In any South African household the room temperature may vary considerably during a 24 h period. This is especially the case for households from low-income communities. Sensory studies (Van Wyk, 2001) indicated that a variation in room temperature when Kefir is made at home would not result in huge taste variations or the development of any strong off-flavours. It will, however, have a slight effect on the "sourness" and "creaminess" of the product. It was found that the "sourness" and "creaminess" of Kefir increases with increase in incubation temperature from 25° - 35°C, due to the growth promotion of different groups of Kefir micro-organisms at the different temperatures.

The specific sensory properties of Kefir can be slightly changed by: variation in the starter cultures used for Kefir production (Duitschaever *et al*., 1988); the heat treatment of the milk (Mann, 1979; Marshall, 1993; Merin & Rosenthal, 1986); the starter concentration used (Garrote *et al*., 1998; Schoevers, 2000); the fermentation temperature; and shortening or lengthening of the fermentation time (Liu & Moon, 1983; Koroleva, 1988). The possibility of easily changing the main characteristics will be an important marketing factor if sensory studies indicate that changes in the taste are needed to make it more acceptable for selected target markets.

5.2 Acceptability by lactose-intolerant individuals

A number of reports have shown that lactose malabsorbers can consume, without harmful effects, certain fermented dairy products, of which Kefir (like Maas) is one (Roginski, 1988; Shah, 1993). The most likely explanation for an improved tolerance of lactose when it is consumed as part of Kefir is the presence of microbial ß-galactosidase derived from the bacterial starter cultures used in fermented milk production, which, like intestinal lactase, can break down lactose to its component sugars (Buttriss, 1997). Another theory proposed by Gurr (1987) states that cultured products, because of their acidity and the consequent finer dispersion of protein in the stomach, retard the emptying of the stomach's contents into the small intestine. Any capacity to break down lactose, whether it be of microbial or indigenous origin, would then have a longer period to take effect and consequently lactose digestion would theoretically be more efficient, even when the specific activity of the enzyme is low (Gurr, 1987). The lactose concentration of Kefir (ca. 4%) is also lower than that of milk (ca. 4.7%). This is due to the metabolic activity of the lactic acid bacteria that occurs naturally as part of Kefir grains (Shah, 1993).

5.3 Nutritional value

Fermented milk products are just as nutritious as raw milk and in some ways even more so and have longer shelf-life stability than most other liquid milk products. The nutrient composition of Kefir is similar to that of milk, with Kefir containing more vitamin B_1, B_2 and folic acid (Roginski, 1988; Libudzisz & Piatkiewicz, 1990). Propionibacteria can even be added to Kefir grains to increase the vitamin B_{12} concentration (Cerna & Grabova, 1997). The concentrations of lactic acid, galactose, free amino acids and fatty acids are also increased as a result of the Kefir fermentation process (Gurr, 1987). The fermentation process has little effect on the mineral content of milk (Buttriss, 1997).

5.4 Packaging, distribution and storage

Kefir grains can be successfully preserved by a variety of techniques, such as air-drying, freeze-drying, cold storage and freezing (Cilliers, 2000). The freeze-dried Kefir grains can also be successfully packaged in a variety of plastic films (Cilliers, 2000) and the distribution of Kefir grains to low-income urban consumers will, therefore, pose no problem.

The packaging and distribution of Kefir itself may prove more complicated. The carbon dioxide that forms in Kefir as a result of the yeast-lactic acid fermentation may cause "bulging" of containers. Appropriate containers, that can withstand the escaping gas pressure or allow for the CO_2 to escape, should be used. Kefir can be kept for 8 – 19 days at refrigeration temperatures (Roginski, 1988).

Food retailing in informal settlements and squatter areas is quite unique. It takes place exclusively through a large number of geographically dispersed informal traders dealing from informal structures, known as "shops" or "*spazas*" who, in turn, do their purchases from wholesalers and "cash and carry" outlets such as Metro and Makro that are usually situated nearby on the outskirts of the townships (Myburgh, 1996). These informal traders and communities have cooling and storage constraints and freeze-dried Kefir grains will thus be perfect to distribute through these channels. Kefir also has keeping-ability at room temperature and does not need urgent cooling as is the case with pasteurised milk.

5.5 Price

Since the manufacturing of Kefir is simple and Kefir grains reusable, the cost of making Kefir would only be the price of the milk purchased and the initial acquisition of the Kefir grains. By contrast, commercially manufactured Maas is fairly expensive, with the retail price averaging more than double that of fresh milk.

5.6 Inhibitory activity against potential spoilage and pathogenic organisms

Studies have indicated that Kefir possesses an antimicrobial activity against a wide variety of Gram-positive and negative bacteria, as well as some fungi (Saloff-Coste, 1996; Garrote *et al*., 2000). Van Wyk (2001) studied the inhibitory activity of Kefir towards certain spoilage micro-organisms and potential pathogens that may occur in milk. The test organisms used included strains of: *E. coli*; *Staphylococcus aureus*; *Bacillus cereus*; *Listeria monocytogenes* and *Clostridium tyrobutyricum*, chosen because of their occurrence in unpasteurised milk and subsequent danger to human health. These test organisms (10^4 cfu.ml^{-1}) were inoculated into pasteurised milk together with Kefir grains (18 g.l^{-1}). No Kefir grains but only test organisms, were added to the control milk samples. In Figure 1, for example, the survival of *E. coli* in Kefir and in milk is shown.

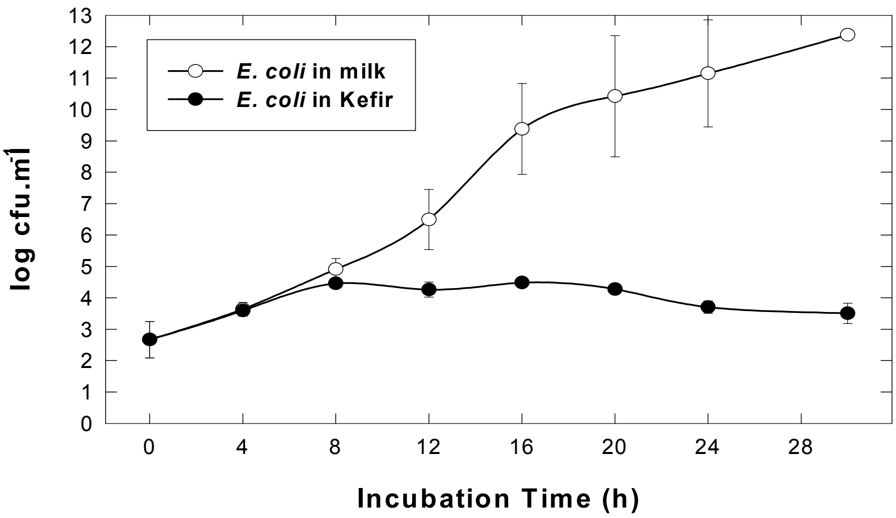

Figure 1: The viable counts of *Escherichia coli* in Kefir and in milk
Source: Van Wyk (2001)

E. coli was selected because of the general use of this bacterium in the food industry as an indicator of food microbial quality and safety and as indicative of faecal contamination. The *E. coli* in the Kefir samples showed total growth inhibition after 16 h of incubation when compared to the growth of *E. coli* in the control milk samples. The same pattern was observed for all the test organisms. Thus, Kefir does have a strong inhibitory effect on the growth of certain micro-organisms that may cause spoilage of milk or, more importantly, human diseases (Van Wyk, 2001). According to Khedkar *et al*.

(1991), studies on factors affecting the viability of potential spoilage and pathogenic micro-organisms in fermented milks have indicated that at the beginning of fermentation the decrease in growth of these organisms is probably due to antimicrobial compounds, peroxide and decrease in redox-potential. Later on, the low pH, the presence of organic acids and perhaps diacetyl contributes to the inhibition of potential spoilage and pathogenic micro-organisms in fermented milks.

As Kefir grains possess an inhibitory activity towards certain pathogens that may occur in either raw or inferior pasteurised milk, the grains have the ability to make milk safer to consume. Kefir acts as a probiotic when it is consumed and thus protects the host against food-borne diseases. Furthermore, as a home-made product, Kefir presents a low risk of putrefaction due to its ability to inhibit spoilage micro-organisms. Kefir is thus an excellent way of preserving milk, especially when refrigeration facilities are not available.

5.7 Taste

5.7.1 Trained panel evaluation

Kefir, commercial Maas and Maas prepared in the laboratory with a commercial culture (“laboratory Maas”) were sensorily evaluated by a trained panel using descriptive analysis with scaling (Van Wyk, 2001). This was done to characterise the main differences between these products. The key differences between the products are illustrated by the star charts shown in Figure 2.

Kefir was found to be more sour than laboratory and commercial Maas while the “yeasty” and “cowy” tastes of commercial Maas were more pronounced than that of Kefir and laboratory Maas. Kefir was the most effervescent of the three products and Maas was generally smoother than Kefir. Commercial Maas was the creamiest of the products. The differences found between Kefir and Maas can mainly be ascribed to the unique yeast-lactic acid fermentation that occurs during Kefir production, in contrast to the lactic acid fermentation that occurs during Maas production. The specific properties of commercial Maas can probably be ascribed to the added flavourants, colourants and other food additives (Van Wyk, 2001). The specific sensory properties of Kefir can, however, be slightly changed, if required, by variation in: the starter culture used for Kefir production (Duitschaever *et al*., 1988); the heat treatment of the milk (Mann, 1979; Marshall, 1993; Merin & Rosenthal, 1986); the starter concentration used (Garrote *et al*., 1998; Schoevers, 2000); the fermentation temperature (Van Wyk, 2001); and the fermentation time (Liu & Moon, 1983; Koroleva, 1988).

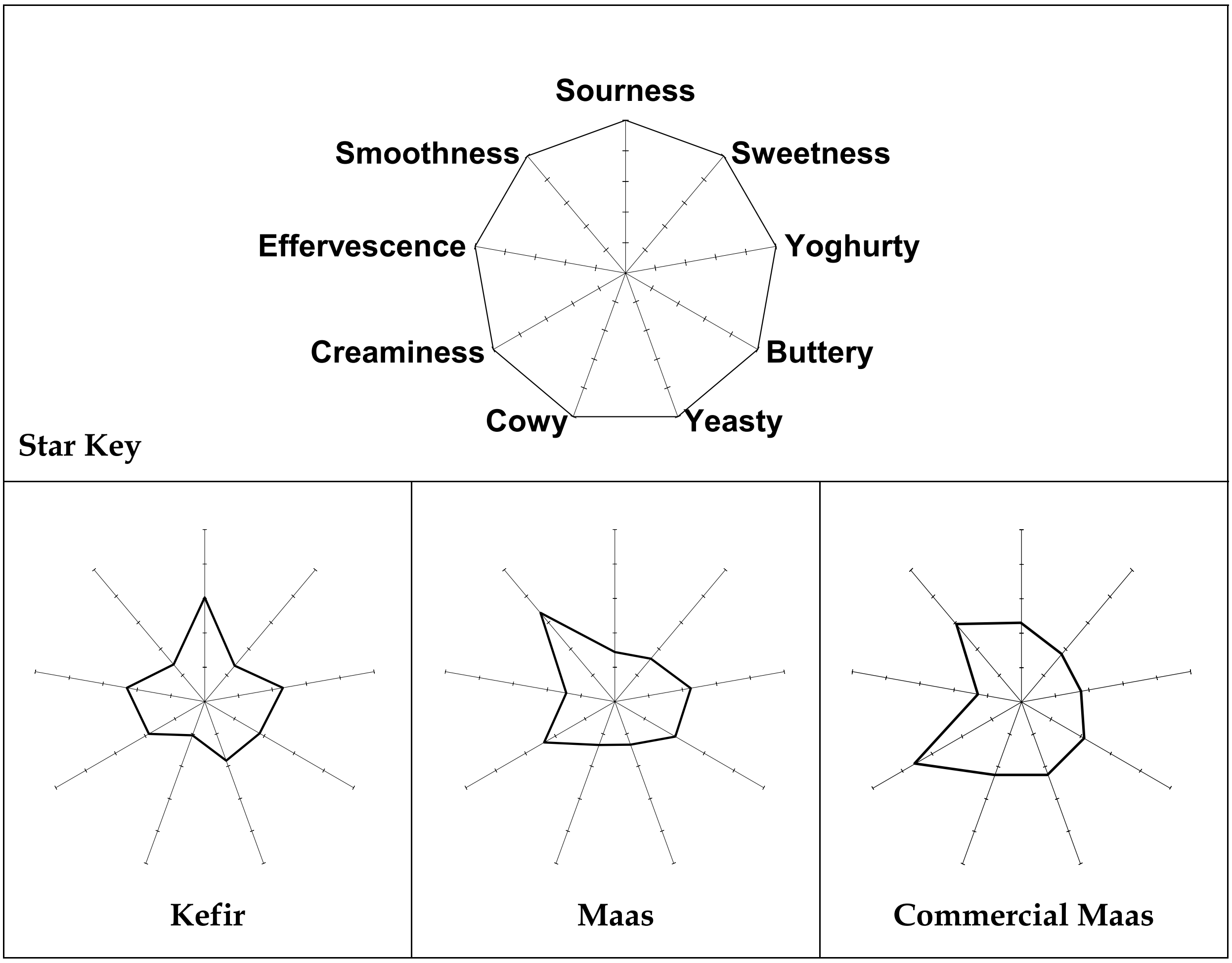

Figure 2: **The key differences between Kefir, Maas and Commercial Maas Source: Van Wyk (2001).**

5.7.2 Consumer panel evaluation

Paired preference studies were done with Kefir (an unknown product to South African consumers), commercial Maas and laboratory Maas by consumer panels consisting of panellists of different ages and population groups to indicate if one of these products is significantly preferred by the specific panels (Van Wyk, 2001).

To investigate the significance of this data the Roessler Table for Paired Preference Tests (two tailed) (Stone & Sidel, 1993) was consulted. In this table the minimum number of agreeing judgements necessary to establish significance at various probability levels for the paired-preference test, are tabled.

The first study was done using 50 African school learners in an urban environment to determine if young African urbanites prefer Kefir or commercial Maas. If Kefir were to be marketed to urban Africans, commercial Maas would be the main competitor. Of the 50 young Africans 82% preferred commercial Maas to Kefir. The data from this study showed that commercial Maas was significantly preferred to Kefir by young African males at $p = 0.05$ (18 agreeing judgements at $n = 24$) and by young African females at $p < 0.001$ (more than 21 agreeing judgements at $n = 26$). For the total number of young African tasters, the preference of commercial Maas to Kefir was significant at $p < 0.001$ (more than 37 agreeing judgements at $n = 50$). A question about their families' buying behaviour revealed that 96% of the subjects' families have purchased commercial Maas upon occasion. The young Africans were thus familiar with this product. This was surprising, as commercial Maas is expensive, although it can also be argued that there is no alternative product on the market to satisfy their need for a fermented milk product. It can be concluded that commercial Maas is preferred to Kefir by young Africans living in "townships." This could be attributed to the fact that this is the only Maas product they are familiar with and accustomed to and that this was the first contact they had made with Kefir.

The second study was done using 89 adult Africans to determine if they prefer laboratory Maas, which is comparable to either traditional Maas or Kefir. The panel consisted of seasonal workers who still keep homes in rural areas and, therefore, still have traditional taste preferences such as that for traditional Maas. The data from this study showed that Kefir and laboratory Maas were preferred equally by males at $p > 0.05$, by females at $p > 0.05$ and by the total number of subjects at $p > 0.05$ (less than 55 agreeing judgements at $n = 89$, according to the Roessler Table). It was concluded that no significant preference exists and thus that adult Africans preferred Kefir and laboratory Maas equally.

One can assume, therefore, that Kefir and traditional Maas are comparable in taste. Both these products contained no added flavourants, colourants and other food additives, in contrast to the commercial product. If Kefir is to be marketed commercially, adult Africans, who still value their traditional eating culture would be a logical target market for this product. Kefir would not be competing with traditional Maas as urban Africans do not have easy access to this product for reasons mentioned earlier.

In a third study Kefir and laboratory Maas were evaluated to determine if there is a difference in the preference for Kefir or traditional Maas between the different population groups in South Africa. Of the 371 young people (40% White, 48% Coloured and 12% African) who tasted the products, 56% preferred Kefir to laboratory Maas. It was found that 54% of the White panellists, 58% of the Coloured panellists and 56% of the African panellists preferred Kefir to laboratory Maas. According to the Roessler Table there is no significant difference ($p > 0.05$) between the preference of Kefir and laboratory Maas between the different population groups. The panellists thus preferred Kefir and laboratory Maas equally.

A general discussion with the panellists indicated that the tasters were not familiar with Kefir, but the African panellists in this study were familiar with Maas. This study, once again, proved that, although Kefir is a "new" product almost totally unknown to South Africans, it is comparable to traditional Maas in preference, making it an appropriate substitute for a product that is in demand but currently unavailable in urban areas.

6. CONCLUSIONS

Kefir has various differential advantages to commercial and traditional Maas. It can easily be made from pasteurised or raw milk, in contrast to traditional Maas, which can only be produced from raw milk. As mentioned earlier good-quality raw milk is not freely available to the public but pasteurised milk, however, is readily available in the market. Kefir can be made at a cost slightly higher than that of milk from Kefir grains that are re-usable. With subsequent use of the grains, the cost of Kefir will decrease, making it much cheaper than commercial Maas. The distribution of Kefir grains on large scale does not present any problems.

Kefir is a "natural" product with no additives, and it also enhances the user's health as it has numerous health benefits (Saloff-Coste, 1996; Buttriss, 1997) and it can be tolerated by lactose-intolerant individuals. As Kefir grains possess an inhibitory activity towards certain spoilage organisms and health-threatening pathogens that may occur in either raw or inferior pasteurised milk, it has the ability to make milk safer to consume and lengthen the shelf-life. Sensory studies indicated that the taste of Kefir is comparable to that of traditional Maas, making it an appropriate substitute for a product that is in demand but currently unavailable in urban areas.

In view of all these factors, Kefir and Kefir grains are suitable low-cost products for marketing to the low-income urban African consumer market.

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