JMBFS
Journal of Microbiology, Biotechnology and Food Sciences
International peer-reviewed scientific online journal

Published by Faculty of Biotechnology and Food Sciences

Gadaga et al. 2013 : 2 (6) 2387-2391

TRADITIONAL FERMENTED FOODS OF LESOTHO

Tendekayi H. Gadaga[1], Molupe Lehohla*[2], VictorNtuli*[3]

Address(es): Dr. Tendekayi H. Gadaga,
[1]Department of Environmental Health, University of Swaziland, P.O. Box 369, Mbabane, Swaziland, +268 76758167.
[2]Department of Pharmacy, National University of Lesotho, P.O. Roma, 180, Lesotho.
[3]Department of Biology, National University of Lesotho, P.O. Roma, 180, Lesotho.

*Corresponding author: tgadaga@gmail.com

ARTICLE INFO

Received 28. 9. 2012
Revised 5. 12. 2012
Accepted 3. 4. 2013
Published 1. 6. 2013

Review

OPEN ACCESS

ABSTRACT

This paper describes the traditional methods of preparing fermented foods and beverages of Lesotho. Information on the preparation methods was obtained through a combination of literature review and face to face interviews with respondents from Roma in Lesotho. An unstructured questionnaire was used to capture information on the processes, raw materials and utensils used. Four products; *motoho* (a fermented porridge), *Sesotho* (a sorghum based alcoholic beverage), *hopose* (sorghum fermented beer with added hops) and *mafi* (spontaneously fermented milk), were found to be the main fermented foods prepared and consumed at household level in Lesotho. *Motoho* is a thin gruel, popular as refreshing beverage as well as a weaning food. *Sesotho* is sorghum based alcoholic beverage prepared for household consumption as well as for sale. It is consumed in the actively fermenting state. *Mafi* is the name given to spontaneously fermented milk with a thick consistency. Little research has been done on the technological aspects, including the microbiological and biochemical characteristics of fermented foods in Lesotho. Some of the traditional aspects of the preparation methods, such as use of earthenware pots, are being replaced, and modern equipment including plastic utensils are being used. There is need for further systematic studies on the microbiological and biochemical characteristics of these these products.

Keywords: Fermentation, *motoho, mafi, joala, hopose,* Lesotho

INTRODUCTION

Lesotho is a landlocked country covering 30 350sq km with a population of about 1.8m. The terrain is characterized by mountains and valleys with the altitude ranging from 1388m (lowlands) to 3482m above sea level **(Majara, 2005)**. The livelihoods of the communities differ depending on whether they live in the mountains, foothills, valleys or urban areas. However, many people live in the rural areas, especially in the mountains and maintain a traditional lifestyle. The people consume diverse traditional foods including wild vegetables and traditional fermented foods.

Fermentation is one of the oldest methods of preserving foods. It has benefits in that it is inexpensive, provides much needed nutrients and destroys undesirable components including natural toxins and pathogenic microorganisms, and enhances the flavour **(Steinkraus, 2002; Blandino *et al*., 2003)**. Traditional fermentation is usually done spontaneously without the addition of a commercial starter culture. The fermenting microorganisms come from the raw materials, utensils or from a previous batch of the fermented product (back slopping) **(Steinkraus, 2002)**. Several studies have shown the important role of fermentation in preventing food borne illnesses, especially childhood diarrhoea **(Motarjemi, 2002)** and enhancing dietary diversity. The predominant microorganisms in most of these foods are lactic acid bacteria, especially *Lactococcus* spp. **(Blandino *et al*., 2003)**. Many African cereal fermented foods are characterised by the presence of lactic acid, the main end product of fermentation by *Lactoccocus* spp. Examples of African fermented foods include *mahleu/mahewu* (sour sorghum or maize meal non-alcoholic beverage, consumed in South Africa and Zimbabwe) **(Gadaga *et al*., 1999)**, *togwa* (thin sour maize meal porridge, consumed in Tanzania) **(Mugula *et al*., 2003)**, and *kenkey* (thick sour maize meal porridge, consumed in Ghana) **(Halm *et al*., 1993)**. Spontaneously fermented milk is consumed in many Southern African countries and is known by various names including *amasi* (South Africa), *emasi* (Swaziland) and *madila* (Botswana). Sorghum is a staple crop in Lesotho. It is drought tolerant and has short season varieties. It is therefore used to make many traditional foods including fermented alcoholic beverages and unfermented thin and thick porridges.

According to available information, very little research has been done on traditional fermented foods of Lesotho, yet some of the traditional foods are widely consumed by the population. The objective of this article, therefore, was to document the preparation methods of traditional fermented foods of Lesotho. The paper will help stimulate new research on the technological characteristics (including the microbiology and biochemistry) of the fermented foods and encourage modernization of the products.

BACKGROUND ON FOOD FERMENTATION IN LESOTHO

Information about the traditional processing methods was obtained through a combination of literature review and interviewing women who prepared the foods in the Roma area of Lesotho. A semi-structured questionnaire was used for the interviews.

Sorghum and maize are staple cereal crops in Lesotho. However sorghum is preferably used to prepare traditional fermented foods. Interviews with women in the Roma area of Lesotho revealed that four products; *motoho* (a fermented porridge), *sesotho* (a sorghum based alcoholic beverage), *hopose* (sorghum fermented beer with added hops) and *mafi* (spontaneously fermented milk), were the main fermented foods prepared and consumed at household level. *Leting, ting, seqhaqhabola (sekhakabolo)* and *sekumukumu* are other traditional fermented foods consumed in Lesotho as documented in literature. The preparation methods are outlined below and comparisons with descriptions of other similar products consumed in other countries are made.

Non-alcoholic fermented foods

Motoho

Motoho is a non-alcoholic sour porridge. Some Basotho (people of Lesotho) like to think of it as a beverage because of its slurry-like consistency. The red type sorghum is usually used for making *motoho*, hence the product has a brownish colour. Figure 1 is a schematic diagram of the production process for *motoho* as described by women preparing the product in Lesotho. The sorghum meal is mixed with warm water (1 part sorghum meal to 3 parts water) to make a thin slurry. A traditional starter culture called *tomoso* (described below) is then added (1 part *tomoso* to 20 parts of the slurry) and the mixure is allowed to ferment. In summer, the ambient temperature varies between 25-30°C and fermentation takes 24 h. Normal monthly winter minimum temperatures range from – 6.3°C in the lowlands to 5.1°C in the highlands. It is therefore common in

winter, that the fermentation vessel is covered with a blanket to retain warmth and speed up the fermentation. Fermentation takes about 48-72 h in winter. The fermented product is then boiled for 20-30 minutes and allowed to cool to about 25-30^{o}C, and served. Grinding of the coarse grains before boiling is optional, and this is often omitted (Figure 1). Households usually prepare *motoho* on a weekly basis. However, some prepare it daily for sale. *Motoho* can sometimes be prepared for occasions like funerals or other family feasts and is also served to visitors as a beverage. The product is consumed by the whole family, in the same way as non-fermented porridge called *lesheleshele*. It has a shelf-life of about 5 days at 25^{o}C and therefore can be prepared in large quantities for future use. This is probably the reason why *motoho* has now been successfully produced commercially. It can be bought from street vendors or the supermarket. The boiling of *motoho* after fermentation is also similar to the process described in the commercial production of commercialised instant *mahewu* before drum drying **(Heseltine and Wang, 1980)**. However, scientific literature on the microbiology of *motoho* and the standardization of its preparation is scanty.

Sakoane and Walsh (1987) carried out a study to assess the safety of *motoho* as a weaning food. It was observed that *motoho* effectively inhibited strains of enteropathogenic *Escherichia coli*, *Salmonella* Typhii and *Shigella boydii* 3 hours after fermentation. The pH decreased from 7 to 6.4 during the 12 hours of fermentation. Although the product was boiled after fermentation, it was still found to effectively inhibit these pathogens, suggesting that either the acid or a heat stable inhibitory substance prevented the growth of the microorganisms. **Sakoane and Wash (1987)** also observed that some colonies of *Salmonella* Typhii inoculated at low dilution were able to grow in autoclaved *motoho*, raising concerns about the safety of the product. *Motoho* needs to be handled with very high standards of hygiene to prevent post fermentation contamination. *Lesheleshele,* a non-fermented sorghum porridge consumed in Lesotho had no inhibitory effects **(Sakoane and Walsh, 1987).** In a similar study on the safety of *mahewu* (a maize based fermented gruel), **Simango and Rukure (1991)** reported that some strains of *Escherichia coli* survived for 24 h in the fermented product, but they did not increase in number. Such microorganisms were thought to have found their way into the *mahewu* from the leftover maize porridge used in the preparation of the product, and from contaminated hands and utensils. The pathogens can proliferate in the product before acidity has sufficiently developed.

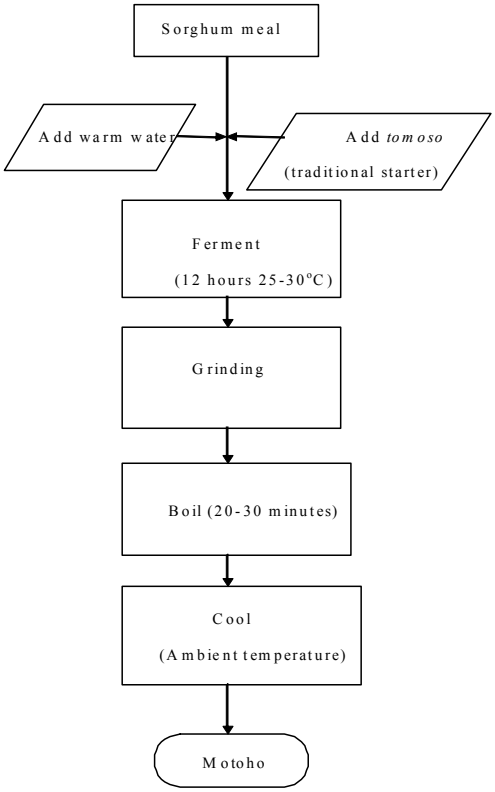

Figure 1 Traditional preparation of *motoho* in Lesotho

Tomoso used in initiating fermentation of *motoho* is a liquid starter culture made by mixing a small amount of sorghum flour with a minimal amount of warm water such that the water just covers the flour. It is then left to ferment spontaneously for a day. Alternatively, it is obtained from a previous successful fermentation (back slopping option). Although the types of microorganisms in *tomoso* have not been systematically studied, it is expected to contain high numbers of lactic acid bacteria that then ferment the slurry into a sour product.

Seqhaqhabola (Sekhakabolo)

An early paper by **Orpen (1902)** described another sour porridge called s*eqhaqhabola (sekhakabolo)* that was prepared by the Basotho. According to the report, coarse maize meal or crushed mealies were mixed with sorghum malt **(Orpen, 1902)**. The sorghum malt acted both as an inoculum and a source of enzymes. Boiling water was then added and mixed well. The mixture was then cooled and left to ferment for about 24 h. It was then strained using baskets and boiled. The strainings were not discarded, but were ground to finer particle size and mixed with the boiled mixture to give a sour porridge as shown in Figure 2. *Seqhaqhabola* is similar to *ilambazi lokubilisa*, a sour porridge prepared by the Ndebele speaking people in Zimbabwe **(Gadaga *et al*., 1999)**. In making *ilambazi lokubilisa*, maize meal is thoroughly mixed with a little amount of water and allowed to ferment in a closed vessel for 2-4 days. The fermented meal is then used to make sour porridge **(Simango, 1997)**. *Ilambazi lokubilisa* has been shown to be batericidal to strains of enteric pathogens belonging to the genera *Aeromonas*, *Campylobacter* and *Salmonella*, and bacteriostatic to strains of *Shigella* and *Escherichia coli* **(Simango and Rukure, 1992)**. This makes the product relatively safe and suitable for use as a weaning food. The process for traditional malting of sorghum used in the preparation of *seqhaqhabola* and other fermented products is shown in Figure 3.

Ting

Franz (1971) reported that *ting* was a sour porridge consumed by the Tswana-Sotho community in the present day Limpopo province of South Africa and possibly the Sotho in Lesotho. *Ting* could be prepared in either of two ways: (a) sorghum (*mabele*) meal was mixed with milk whey and stirred until a thick consistency was obtained and served; OR (b), sorghum meal (40-45%) was mixed with warm water in an earthenware pot and the slurry was allowed to stand in a warm place (30-37^{o}C) for 2 days until it had 'risen' and turned sour (fermented) **(Franz, 1971; Sekwati-Monang and Gänzle, 2011)**. The fermented mixture (pH 3.5-4.0) was then gradually added to boiling water while heating sufficiently to make two types of porridge, *bogobe* and *motogo* (stiff and soft porridge respectively) **(Sekwati-Monang and Gänzle, 2011)** (Figure 4).

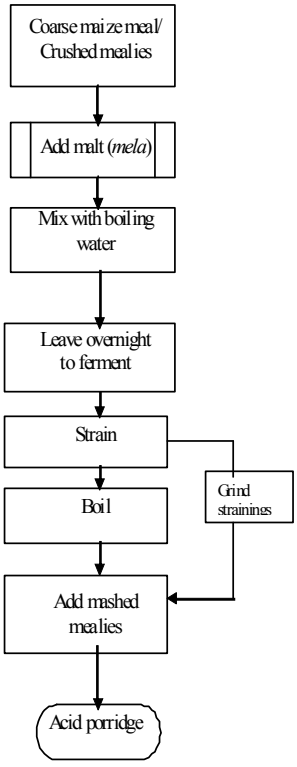

Figure 2 Preparation of *sekhakabolo* (Source: From description of Orpen (1902))

The second method described for preparation of *ting* is similar to that of *mutwiwa*, a sorghum based sour porridge in Zimbabwe **(Gadaga *et al*., 1999)**. In the preparation of *mutwiwa*, dried maize grains are first dehulled using pestle and mortar. The dehulled grains are washed and steeped in clean water and left to ferment until gas production ceases **(Gadaga *et al*., 1999).** The fermented maize is then dried and pounded into a meal which is then used to make a thin or thick porridge. A study on *ting* by **Madoroba *et al*. (2009; 2011)** found that *Lactobacillus fermentum*, *Lb. plantarum* and *Lb. Rhamnosus, Lb. parabuchneri*, *Lb. casei, Lb. coryniformis*, Lb. *curvatus* and *Weissella cibaria* were the

predominant lactic acid bacteria in the product. These species are also commonly isolated from a wide range of African traditional fermented foods and beverages including *fufu*, *kenkey* and *ogi* (**Steinkraus, 1996; Mugula *et al.*, 2003)**. *Lb. plantarum* in particular is known to be acid tolerant and can break down fermentable substrates in plant based materials (**Steinkraus, 2002)**. The presence of these microorganisms and the low pH can inhibit the proliferation of pathogens and enhance the safety of the food. In another study, **Kunene *et al.* (1999)** in South Africa reported that adults consumed the thick form of the porridge from *ting* at ceremonies such as weddings and funerals, while a diluted form/thin porridge was used as weaning food.

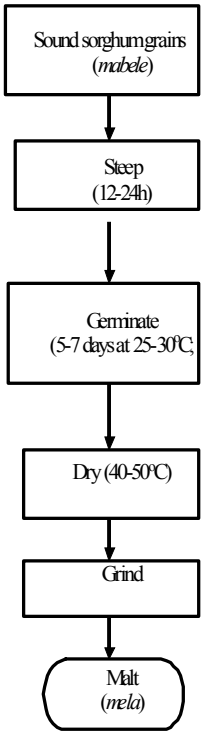

Figure 3 Traditional preparation of sorghum malt (*mela*) in Lesotho

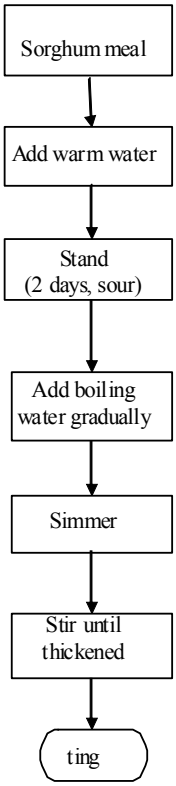

Figure 4 Preparation of *ting* (From description of **Franz (1971)**

Leting

Leting is described in literature as another fermented sour mash consumed in Lesotho. According to the description by **Orpen (1902)**, malted *Sorghum bicolor* was dried and ground into a fine meal. A portion of this meal was then mixed thoroughly with hot water until no particles of the malt remained at the bottom. It was then ready for serving. However, when left at room temperature (c.a. 25°C), it fermented and became sour. **Orpen (1902)** noted that *leting* was similar to sweet wort, but was acidic, refreshing and nourishing with up to 10.5% alcohol. Despite the alcohol content, it was consumed by all age groups. The reported alcohol content suggests that the product was left to ferment for a considerable time. **Novellie (1981)** also reported that the alcohol content of *leting* increased by volume from 0.2 to 3.1% from day 1 to day 6, indicating that as it was left to ferment it became more alcoholic. **Goldberg and Thorp (1946)** observed that the souring of the sorghum meal and malt during the making of *leting* resembled the first stage of sorghum beer brewing, and hence if left to ferment for a long time it would became alcoholic on storage. **Hesseltine and Wang (1980)** put *leting* in the same category as sorghum beer and described it as a thick, acidic, weakly alcoholic drink. However, **Orpen (1902)** mentioned that *leting* had some health and/or nutritional benefits. For example, during the early part of the 20th century, *leting* was successfully used to prevent scurvy among soldiers stationed at Bloemfontein, South Africa **(Orpen 1902)**. It was argued that *leting* should be given to workers on a regular basis so as to add to their health and vitality **(Orpen 1902; Harford, 1905; Goldberg and Thorp, 1946)**.

Goldberg (1946) and **Rooney (1985)** also compared *leting* to *mahewu*. **Goldberg (1946)** reported that it contained 9.5% solids, while **Rooney (1985)** described a souring process that was similar to that described by **Orpen (1902).** According to **Rooney (1985)**, ground sorghum, sometimes mixed with sprouted sorghum, was exposed to boiling water and held at elevated temperatures for up to 20 min and then allowed to cool. The product was left to sour with very little alcohol being produced **(Rooney 1985)**. The product was strained before serving. The strainings were then used to make a light fermented drink by adding water, or the dregs were mixed with more sorghum meal to make a type of bread.

This description of *leting* suggests that it may be similar to sorghum or millet based Zimbabwean product called *masvusvu* **(Zvauya *et al.*, 1997)** and not *mahewu*, which is made from maize **(Gadaga *et al.*, 1999)**. Briefly, *mahewu* is prepared in the following way: Left-over thick maize meal porridge is cleaned, broken into small pieces, and mixed with water. A little sorghum or millet malt is then added and mixed thoroughly and left to ferment for 24 to 48 h. The fermentation is due to the natural flora of the maize meal, malt and the utensils **(Gadaga *et al.*, 1999).** Backslopping is rarely practiced but the same pot is usually used every time a fresh product is made. *Mahewu* is now produced commercially in several countries in southern Africa. On the other hand, in preparing *masvusvu*, finger millet is malted then milled and the flour is mixed with water. The mixture is slowly heated to almost boiling for 80 minutes. The resulting mash is called *masvusvu*, which is cooled, strained and served or allowed to fermented to make other products like alcoholic beverages.

Alcoholic beverages

Traditional alcoholic beverages in Lesotho are generally referred to as *joala*. There are a number of such beverages, which are all intoxicating and are meant for consumption by adults during feasts or just as refreshing drinks**.** These beverages include *hopose*, *sekumukumu* and *sesotho* beer.

Hopose

This is a home-made alcoholic beverage which derives its name from the use of hops in its preparation. This makes it unique among African traditional alcoholic beverages. The hops are mixed with warm water, to which brown wheat meal/flour is added to make a thin gruel. Brown sugar (about 1kg for 20 liter preparation) is then added and the mixture is left for about 20 to 30 min. A traditional starter culture (or commercial yeast, *Saccharomyces cerevisiae*) and malt are then added to the lukewarm mixture. The mixture is left overnight after which it is sieved to remove large pieces, and another portion of brown sugar is then added. The mixture is then ready for consumption.

Sekumukumu

This alcoholic beverage is made from bread, brown sugar and *tomoso*. Traditionally, this is prepared from sorghum meal bread made from the spent grains from the processing of *leting*. Water is boiled then cooled to ambient temperature (25-30°C). The sorghum meal bread is broken into small pieces and added into the water, together with *tomoso* and/or yeast. The mixture is then left to ferment for 24-48 h. It is then sieved to remove the dregs before consumption.

***Sesotho* (sorghum beer)**

Traditional sorghum beer in Lesotho is called *sesotho* **(Asita *et al.*, 2011)**. According to information obtained from women who prepare *Sesotho,* sorghum

(or occasionally maize meal) and wheat meal are mixed together in equal amounts and cold water is added to make a stiff consistency. Boiling water is then added to make a thin gruel, which is then cooled to about 30-35°C. A traditional liquid starter, *tomoso*, is added and the container is covered with a blanket to retain warmth. The mixture is left to ferment overnight or for 24 h to 48 h, depending on the ambient temperature. It is then boiled for 2-3 h and then cooled to 30-35°C. A solid starter culture called *moroko* (spent dregs from a previous fermentation) is added and the mixture is fermented for a further 24-48 h. It is then filtered to remove coarse particles to give a refreshing alcoholic drink (Figure 5).

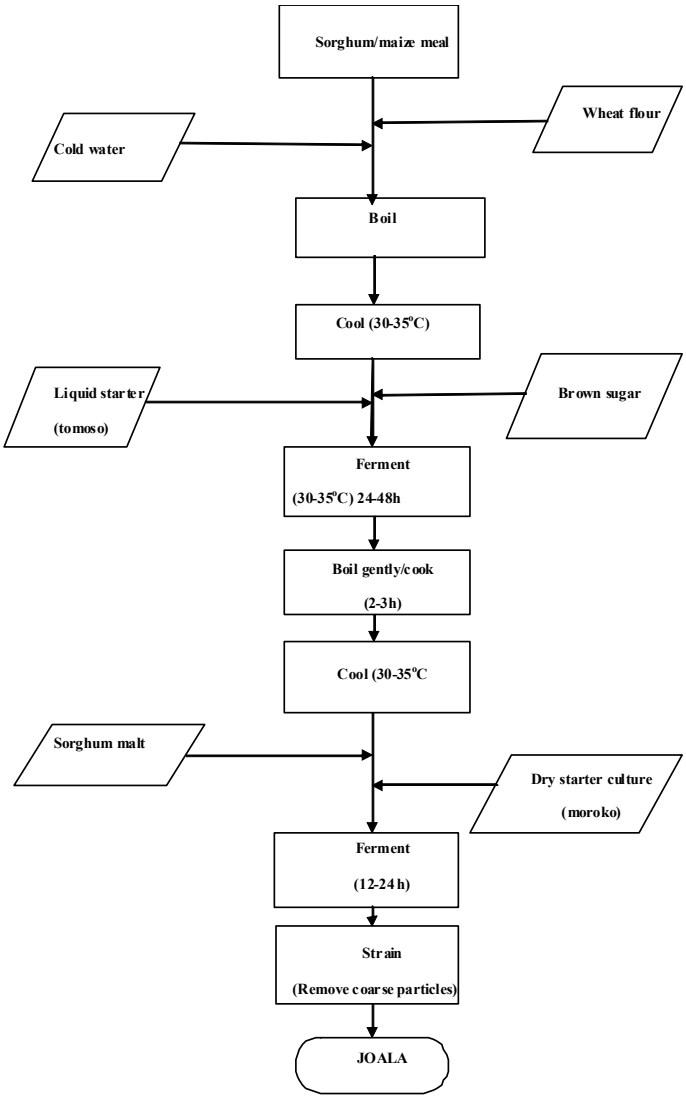

Figure 5 Traditional preparation of *sesotho* (sorghum beer) in Lesotho

Orpen (1902) reported that the sorghum beer in Lesotho was prepared by first boiling sweet wort, similar to the process in making *leting*. Sorghum meal was then added and the mixture was allowed to ferment for 24-48 h. The product was alcoholic with a raw taste and gritty texture. While the method used by the traditional brewers in Lesotho today can take up to 5 days, the method described by **Orpen (1902)** only took about 2 days. The characteristics of these two products are bound to be different. The Northern Sotho in South Africa also used to make a sorghum beer called *bjalwa* **(Franz, 1971)**, which is probably the same name as the *Sesotho joala,* only spelt differently. *Bjalwa* was made by mixing sorghum malt with clean water in earthenware pots and allowed to ferment for a day or more. The mixture was then boiled and cooled to ambient temperature. More malt was then added and again allowed to ferment for a day or more (24h-48 h). This fermented product was then strained and cooled to give *bjalwa*. The process is very similar to that described by women making *sorghum beer* in Lesotho today, except that no *tomoso* was added (Figure 5). Apart from the description of the preparation process, there is no additional information on the microbiological, biochemical or nutritional information of *joala* in literature.

The processing of *sesotho* is similar to other sorghum beers of the Bantu people in southern Africa. For example, it is similar to *doro/uthwala*, a traditional beer in Zimbabwe, which is also produced over 5 to 7 days **(Madovi, 1981; Gadaga *et al*., 1999)**. *Umqombothi* is the Shangaan name given to the South African sorghum beer while the Sotho speaking people call it joala **(Katongole, 2008)**. It has a pinkish colour and a yoghurty flavour and is consumed in the active state of fermentation with a shelf life of 2-3 days **(Novellie, 1966)**. Other studies on similar products in southern Africa have shown that the alcohol content in fermented sorghum beer can range from 3-5% **(Hesseltine, 1979; Parawira and Muchuweti, 2008)**, and is rich in B-vitamins. *Umqombothi* was found to contain up to 2.9% alcohol **(Katongole, 2008)**. Yeasts and lactic acid bacteria are thought to be the predominant microorganisms during the fermentation, with *Saccharomyces cerevisiae* and *Candida krusei* being some of the most common yeasts isolated. Lactic acid bacteria isolated from other sorghum beers include *Lactobacillus helveticus, Lb. salivarius, Pediococcus damnosus,* and *P. partulus* **(Katongole, 2008)**. Other wild yeasts and bacteria from the ingredients and the beer pots should be present and contribute to the flavour characteristics of the beer as well as inhibit pathogenic microorganisms. There is therefore need to isolate and identify the diversity of microorganisms in *sesotho* beer. Sorghum beer prepared in metal containers is also high in iron **(Mandishona *et al*., 1999; Choma and Alberts, 2007).** In South Africa, traditional beer fermented in either iron pots or plastic containers was found to have iron levels ranging from 15 mg/l to 67.8 mg/l and 6 mg/l to 17 mg/l, respectively. Consumption of the traditional beer seemed to prevent iron deficiency in those at risk of developing such deficiency, but appeared to precipitate iron overloading those at risk of developing iron overload. **Moyo *et al*. (1997)** also observed that the mean concentration of iron in the supernatants of nine samples of traditional beer was 46 mg/L. The men (14.3%) in the study showed a combination of an elevated serum ferritin and a transferrin saturation of more than 70%, suggestive of substantial iron overload. **Mandishona *et al.* (1999)** also concluded that the consumption of traditional beer, rich in iron, protected women against iron deficiency as none of the women drinkers in the study had iron deficiency anaemia.

Fermented milk

The traditional fermented milk in Lesotho is called *mafi*. It is traditionally prepared by allowing raw milk to ferment spontaneously in clay pots until thick curds form. This may take 2 to 3 days at 25-30°C. The thick curds are then consumed with thick porridge called *papa* or on its own as a refreshing drink. This is similar to the other differently named fermented milks in Southern Africa, such as *amasi/emasi* (South Africa, Zimbabwe/Swaziland). The South Sotho in South Africa also called spontaneously fermented milk *mafi* **(Beukes *et al*., 2000)**. In this case the whey is usually drained from the milk curds, but it is also consumed as a side relish with thick sorghum or maize meal porridge (*papa* or *bohobe*). **Franz (1971)** described a product similar to *mafi* that was prepared by the Northern Sotho or Sotho-Tswana community in the Petersburg region in South Africa. The product was called *mange*. Milk was curdled in large earthenware pots. The butterfat was then skimmed off with the aid of a calabash vessel. The remaining milk was then sieved through sisal mats to obtain a thick product. Earthenware pots are no longer popular as fermentation vessels, even in Lesotho. The women interviewed in the Roma area of Lesotho reported that they now use plastic or metal containers. The weather in Lesotho can be very cold in winter and it is common to find that the fermenting vessel is covered with a blanket to maintain a warm temperature.

Mafi is also comparable to *madila*, the traditional fermented milk produced in Botswana, **(Ohiokpehai and Jagow, 1998).** To prepare *madila* fresh milk is filtered through a strainer and placed in an enamel/metal bucket. This is then kept in a warm place (c.a. 30°C) for 24 h to initiate fermentation. The soured milk is then poured into a woven polypropylene sack and a further bucket of one day old soured milk is added each day over a seven or eight day period. During this period the *madila* continues to ferment. The bag is then hung from a beam for three or four days during which time the whey drains away through the woven bag. Finally the *madila* is removed from the bag and mixed with fresh milk in a ratio of 4:1 before consumption or sale **(Ohoikpehai and Jagow, 1998).** Although the microbial and biochemical properties of *mafi* are yet to be studied in detail, previous work with *amasi* in Zimbabwe showed that several species of lactic acid bacteria, yeasts and even some coliforms were present during fermentation **(Gadaga *et al*., 2000; Mutukumira, 1995)**. The pH of the product is usually below 4.5, sufficient to inhibit many pathogenic microorganisms such as *Salmonella* spp. and *Escherichia coli* strains. However, **Gran *et al*. (2003)** found that pathogenic strains of *E. coli* inoculated into spontaneously fermented milk or that produced by back-slopping had unacceptably high numbers of the *E. coli* surviving, even 48 h after fermentetion. In a separate study, Nyatoti *et al*., (1997) reported that out of 12 samples of naturally soured milk used as weaning foods, two contained enteropathogenic *E. coli. Strains of E. coli* O157:H7 are of particular concern and they have been isolated from raw milk. They can also contaminate milk post-pasteurization if there is poor handling of the milk. However, in a study with *madila* (spontaneously fermented milk in Botswana), **Patty-Hanson *et al.* (2009)** found that *E. coli* O157:H7 could be inhibited when the lactoperoxidase (LP) system in the raw milk was activated. The counts were reduced by more than 5.0 log cfu *mL^{-1}. These observations, however, suggest

that if not hygienically handled, fermented milk products such as *mafi*, *madila* and *amasi* can pose a food safety risk.

CONCLUSION

The traditional fermented foods, *motoho*, *sesotho beer*, *hopose* and *mafi* are commonly prepared and consumed at household level in Lesotho. *Motoho* is now produced commercially and is a popular weaning food. However, some pathogenic microorganisms were able to grow in *motoho*, and fermented milk products similar to *mafi*, demonstrating the need to pay attention to hygiene and food safety issues for these fermented products. *Sesotho* beer (*joala*) and *hopose* bring much needed income for poor families. They are principally made from sorghum meal and wheat meal, respectively. Despite the fact that traditionally brewed sorghum beer is regarded as safe due to its inhospitable environment (pH 3-4), saftey may be compromised by microbial contaminants from raw materials, ingredients and the food handler, thereby jeopardising the health of the consumer. Some traditional fermented foods that were consumed in the past by the Basotho may no longer be available as the population adapts to new food habits. There is need for further research on the technical, microbial and biochemical characteristics of these fermented products.

Acknowledgments: The authors wish to thank the women who were interviewd in Roma, Lesotho for the time they took to explain the different preparation methods for the fermented foods.

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