



**UNIVERSITY OF NAMIBIA**

**MULTIDISCIPLINARY RESEARCH CENTRE (MRC)**

**Science, Technology and Innovation Division**

**Indigenous Knowledge System Technology (IKST) Food & Beverage Program**

**Field Trip Report**

**Study on Fermented Milk (*Omashikwa*) in Northern Namibia (Ohangwena, Oshana,  
Oshikoto and Omusati) Regions**

**16-21 April 2012**

Prepared by: Lusia Heita

Dr. Ahmad Cheikhyoussef

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## DECLARATION

The authors of this technical report declare that this report contains... raw data which have not yet been published and the main purpose of producing this report to add a piece of art to the knowledge body of Namibian Indigenous Knowledge System. This report may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

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## EXECUTIVE SUMMERY

Traditional fermented milk products are widely consumed in the entire world. These products are an important supplement to the local diet and provide vital elements for growth, good health and an appreciate flavor. In Namibia there are many types of fermented milk which are commonly eaten by local people. This study focused on Omashikwa which is the traditional fermented milk of Oshiwambo speaking people and mostly found in four regions Ohangwena, Oshikoto, Oshana and Oshikoto. The purpose of this study was to collect fermented milk samples and to document the processing and the house hold preservation methods of *Omashikwa*. The samples collected will be used to examine the antimicrobial properties of Lactic Acid Bacteria or LAB isolates with potential probiotic use in order to control and eliminate the spread of harmful bacteria in food products. A total of 13 samples were collected and 13 questionnaires were filled in. The first region visited was Ohangwena region in which one village was surveyed, then Omusati region; three villages, Oshana four villages lastly Oshikoto only two villages.

The pH of the samples was done in the field using a pH meter. The pH average ranged between 3.44 - 3.83. There was no significant difference in the house hold processing method of the Omashikwa among the Oshiwambo speaking people. Regarding the indigenous knowledge, all respondents indicated that the milk have social value as it act as a source of income to many. The milk has a very short shelf life of only seven to twelve days.

## INTRODUCTION

Fermented milk is a dairy product obtained by the fermentation of milk, which have been made from products obtained from milk with or without any modification of their composition, via the action of appropriate microorganisms and which result in a lowering of the pH with or without coagulation. The traditional fermentations are taking place as a result of the activities of natural flora present in the food or added from the surroundings (Al-Otaibi, 2009). The nature of fermented products differs from one region to another. It depends on the local indigenous micro flora, which in turn reflects the climatic conditions of the area (Akabanda *et al* 2010)

In Namibia; fermented milks products are consumed by local communities and they have long history in producing fermented milk product for the household food security. The traditional milks have fluctuating qualities due to the natural fermentation uncontrolled fermentation temperature and time. The microbial load in this milk is still not yet known and their antagonistic activities. It is of a need therefore, to examine the biodiversity of LAB microflora and to isolate the most predominant LAB in traditional fermented milk specially the one with antagonistic characteristics. One of these products is “Omashikwa”; which are popular fermented milk products among the Oshiwambo speaking tribe of Namibia and is prepared by natural fermentation of raw milk mixed with clean roots of Sheppard tree (*Bosciaa albitrunca*) and incubated at room temperature ranging from 27 °C to 36oC for 3-4 days to ferment. Omashikwa has a unique effervescent acid taste with a rooty flavour, ropy appearance and slowly whey’s off when left undisturbed for some time (Bille et al., 2002). Fermented food, enjoyed across the globe, conveys health benefits through lactic acid fermentation. The fermentation process can transform the flavor of food from the plain and mundane to a mouth-puckering sourness enlivened by colonies of beneficial bacteria and enhanced micronutrients. Born of both necessity and practicality, lactic acid fermentation proved to be not only an efficient method of preserving food for our ancestors, but also a critical one (Gandhi, 2006 ).

In many societies including our own where sour milk has been prefigured as a health food since the 19th century; fermented food has gained a reputation for its beneficial effects on immunity, intestinal health, and general well-being and for its social value as a source of income in most household.

The collection of fermented milks in the north-west Namibia was done in April 2012 as a part of a Master research project focusing on antimicrobial activities of fermented milks in north-west Namibia. The aims of the field trip was to collect fermented milks samples and to document the processing and house hold preservation methods of this type of fermented milk which will be useful in completing and creation of the starter culture for the future commercialization purposes. The aim was accomplished through interviews with people especially the women, on how to prepare and preserve fermented milk.

## **DATA & METHODS**

### **STUDY AREA**

The area of study was carried out in four regions in the north Namibia; Oshana, Ohangwena, Oshikoto, and Omusati. These four regions are the most common regions which are well known for the communal farming activities, especially cattle in which people get the milk to make sour milk which are commonly known as *Omashikwa*. Although all these regions have the Oshiwambo speaking people, there are thirteen dialects spoken among these four regions. This difference in dialect is that made it of interest to see whether there is significant difference in household processing of *Omashikwa* of the four regions.

The first region visited was Ohangwena Region which includes the redder of oukwanyama and a small portion of the northern part of Ondonga. The northern and western parts of the Region are the most densely populated of this essentially subsistence agricultural Region in which small scale mahangu cultivation and the keeping of cattle form the predominant activities. Although the Region depends on rain fed agriculture, other crops can be established under intensive cultivation. The Region comprises of ten constituencies: Ongenga, Engela, Oshikango, Ondobe, Eenhana, Omundaungilo, Okongo, Ohangwena, Endola, Epembe ([www.parliament.gov.na/constituencies](http://www.parliament.gov.na/constituencies)).

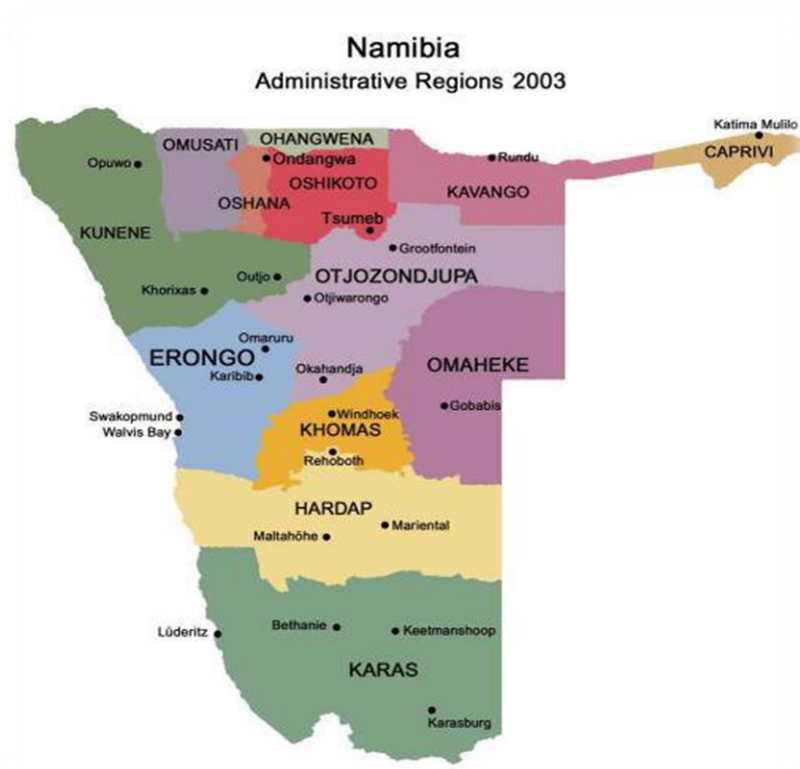
Secondly was, Omusati region which is situated in the northern part of the country, with a population of 228 842 people and a density of 17 people per square kilometer. Omusati is the second highest populated Region after Khomas, with its northern part being more densely populated than its southern part. There are 12 Constituencies in Omusati Region namely Anamulenge, Elim, Etayi, Ogongo, Okahao, Okalongo, Onesi, Oshikuku, Otamanzi, Outapi,

Ruacana and Tsandi ([www.omusatirc.gov.na](http://www.omusatirc.gov.na)). This region has the majority of the dialects among the Oshiwambo people, there are; Aakwambi, Ngandjela, Kwaluudhi, Aambadja, Aakolonghadh

Thirdly was Oshana region which is one of the thirteen regions of Namibia. The name Oshana lends itself well to this region as it describes the most prominent landscape feature in the area, namely the shallow, seasonally inundated depressions which underpin the local agro ecological system. The region is compiled of mostly of three dialect speaking groups; Aakwanyama, aakwambi, and aandonga. There are ten constituencies ;Okaku ,Okatana ,Okatyali ,Ompundja ,Ondangwa ,Ongwediva ,Oshakati East ,Oshakati West ,Uukwiyuand Uuvudhiya

The last region was Oshikoto which is located in the north- central part of Namibia, with a population of 161,007. The region is divided into ten constituencies namely: Eengodi , Guinas , Okankolo, Olukonda , Omuntele, Omuthiyagwiipundi , Onayena, Oniipa, Onyaanya , and Tsumeb respectively. The population of Oshikoto region is relatively young as 43 percent of the whole population is under 15 years of age, and the proportion of the population of senior citizens is 8 percent. Nearly half of the population belongs to the economically active age-group of 15 - 59 years. The majority of the population lives in rural area with 91 percent and a mere 9 percent in urban areas respectively. Oshikoto region is compiled mostly of Oshindonga speaking people.

The four regions; the major portion consists of communal land where the majority of the inhabitants live from subsistence farming. Life on the vast plains of these essentially agricultural regions depends on the seasonal efundja, the floods that feed the rivers and Oshanas.



**Fig. 1 Map of the study area ([www.namibsafari.com](http://www.namibsafari.com))**

## **DATA COLLECTION**

The research team consisted of four people who went on this trip including the driver. This trip was a joined venture with the Oshikundu sample collection Project. The samples were collected from all the dialects in each region. Before research activities were initiated, official letters from MRC-UNAM to regional councils of all the four regions were send a week prior the field trip. The aim of the letters were to inform the council about the coming of the team which was on Indigenous Knowledge on the traditional processing methods, safety and nutritional values for fermented milks (*Omashikwa* ).

The first region visited was Ohangwena region which is compiled of mostly by the Ovakwanyama speaking people, therefore only one village was taken which was the Ondeihaluka village in Engela constituency. Secondly was the Omusati region which has the majority of all the Oshiwambo dialects. Only in five villages in Omusati, milk samples were

found; Ongulumbashe, Tsandi, Etunda, Omutundungu, and Okahao. In Oshana region four collection sites with sour milk were found; Oshakati open market, Onkuni village, Onamungundo village, and ondongwa open market. Lastly was Oshikoto region in which only two collection sites were found with sour milk; olukonda and Oshivelo.

Table 1. The research team

<b>NAME</b>	<b>POSITION</b>
Dr. Eroid Naomab	Research team leader
Dr. Gladdys Kahaka	Research Supervisor
Mr. Werner Embashu	MSc Student
Ms. Lusia Heita	MSc Student

For the collection of samples, villages were randomly picked from each region focusing on the dialects in that region. Because of lack of time, only villages which are closer to the road were considered. The houses were also randomly picked for the collection of milk sample and for the interviews.

Table 2: The regions and villages visited

<b>Region</b>	<b>village</b>	<b>Date visited</b>
Ohangwena	Ondehaluka	19 April 2012
Omusati	Ongulumbashe	19 April 2012
	okahao	19 April 2012
	Tsandi	20 April 2012
Oshana	oshakati	20 April 2012
	onkuni	20 April 2012
	onamungundo	20 April 2012
	ondangwa	20 April 2012
Oshikoto	Olukonda	20 April 2012
	oshivelo	21 April 2012



A structured questionnaire was used for interviews. Interviews were conducted in the local language, Oshikwanyama. Only a few were done in English, in the case of someone who could both understand and speak English. Interviews were done only in the household where milk samples were collected. No GPS was taken since the questionnaires were centered only on the processing method and the preservation methods of the sour milk. No future reference will be needed to go back to those households. The samples were collected in sterilized containers and kept in the cooling boxes with ice. Upon the collection of samples; the pH readings were done in triplicates in the field using a pH meter (Eutech instrument, ECPH602K, Malaysia) that was inserted directly into the sample. Three independent measurements were obtained for each sample. The values were presented as the average of three readings (Gazzola et al., 2012).

## **FINDINGS AND RESULTS**

### **Data analysis**

After sampling the pH of the samples were measured in the field and also after the field trip in the laboratory in triplicates. The means and standard deviation of the pH was calculated using excel to compare the means. The questionnaires were compiled and the processing methods were compared and a flow diagram was made out of this.

The pH values of all the samples decreased significantly from the production day to the end of storage period as shown in bar graph 2. The averages of pH showed that Onkuni village had the highest (3.83) of the milk samples while Onamungundo had the lowest (3.37). The samples collected in Onkuni village were newly prepared than the one from Onamungundo which was prepared 3 days before the collection date. In South Africa, Amasi which is the traditional fermented milk product the pH ranges between 3.6 and 4.2 (Todorov, 2008).

Table 3 readings of the samples in the field

Sample name	pH reading			Average	Standard deviation
	Trial 1	Trial 2	Trial 3		
Omutundungu	3.63	3.62	3.65	3.63	0.015
Ondehaluka	3.76	3.54	3.61	3.63	0.112
Etunda	3.86	3.77	3.72	3.78	0.071
Ongulumbashe 1	3.55	3.78	3.49	3.61	0.153
Tsandi	3.74	3.69	3.71	3.71	0.025
Ongulumbashe 2	3.50	3.43	3.41	3.45	0.047
okahao	3.67	3.62	3.66	3.65	0.026
Ondangwa 1	3.74	3.78	3.79	3.77	0.026
Ondangwa 2	3.40	3.45	3.48	3.44	0.040
Olukonda	3.61	3.65	3.67	3.64	0.030
Onamungundo	3.35	3.37	3.39	3.37	0.02
Onkuni	3.81	3.83	3.85	3.83	0.02
Oshivelo	3.65	3.67	3.49	3.60	0.099

The bar graph 1. shows the pH average of the samples in the field

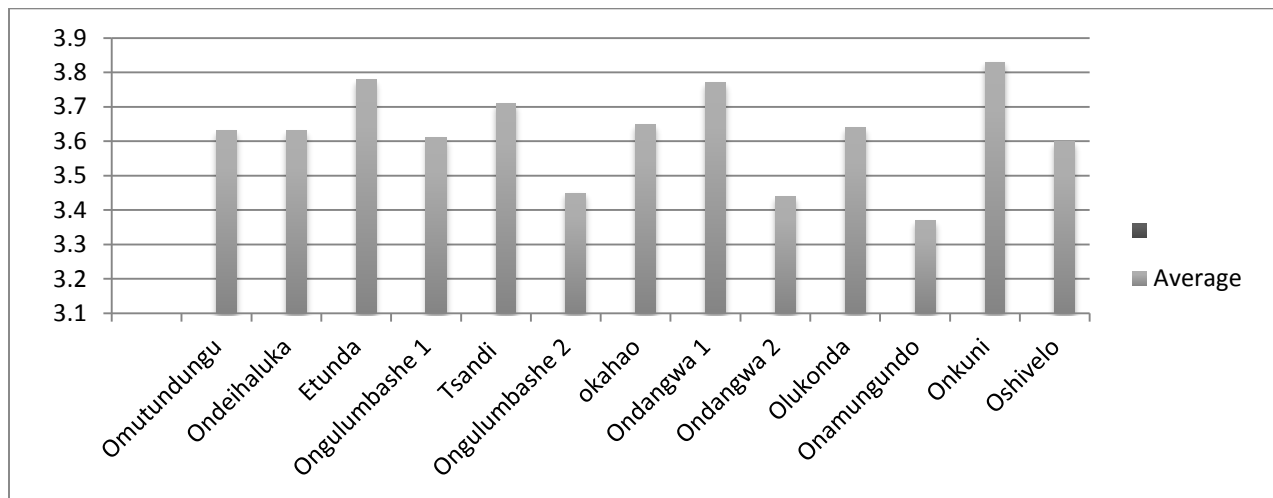
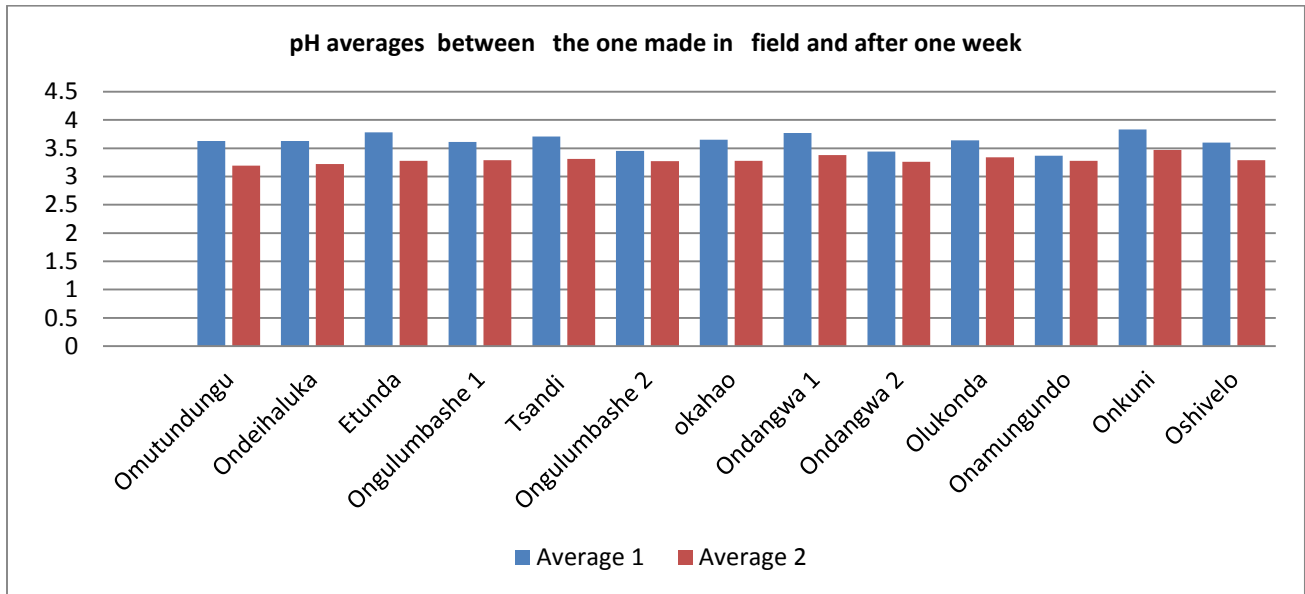


Table 4 pH reading after one week of fermented milk sample collection

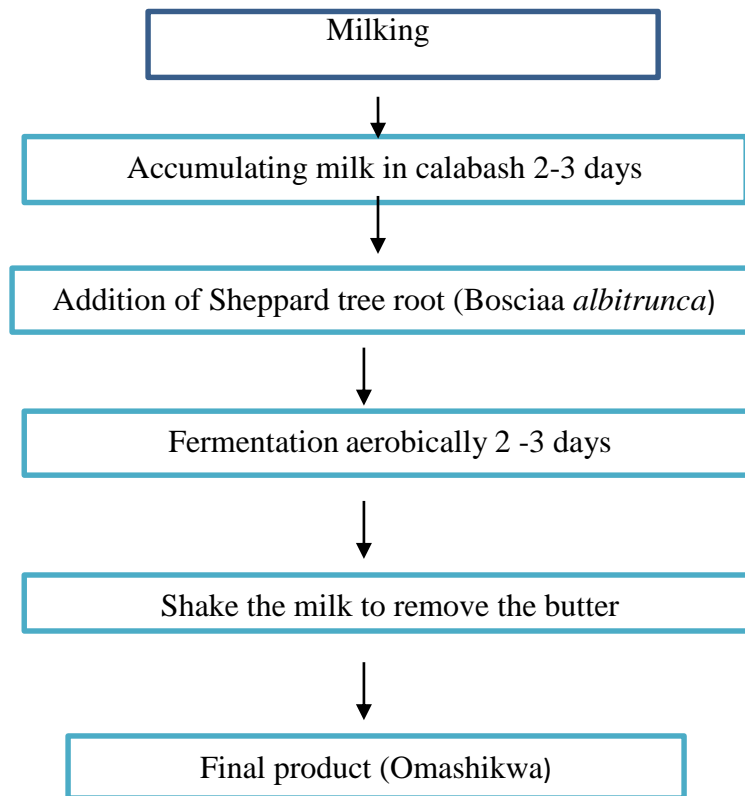
Sample name	pH reading			Average	Standard deviation
	Trial 1	Trial 2	Trial 3		
Omutundungu	3.33	3.24	3.02	3.19	0.16
Ondei haluka	3.19	3.14	3.32	3.22	0.093
Etunda	3.25	3.27	3.32	3.28	0.036
Ongulumbashe 1	3.25	3.28	3.34	3.29	0.046
Tsandi	3.34	3.27	3.31	3.31	0.035
Ongulumbashe 2	3.29	3.30	3.21	3.27	0.05
okahao	3.27	3.32	3.24	3.28	0.040
Ondangwa 1	3.43	3.38	3.34	3.38	0.045
Ondangwa 2	3.26	3.25	3.28	3.26	0.015
Olukonda	3.31	3.35	3.37	3.34	0.031
Onamungundo	3.30	3.26	3.29	3.28	0.021
Onkuni	3.54	3.43	3.45	3.47	0.058
Oshivelo	3.30	3.27	3.29	3.29	0.015

The bar graph 2. Showing the comparisons of pH of samples in the field (Blue) and after one week (Red) from the field



A total of 13 samples were collected and 13 questionnaires were filled in (Annex 2). Of all the questionnaires filled in all the regions visited, it was found that there is no significance difference in the processing method of the milk among the entire ethnical group. The root of *Bosciaa albitrunca* added serves as a flavor enhancer and the milk has a shelf life of about one week. It was found also that the sour milk has significant social value as its used as a source of income in some households and also serves as part of the day to day food as in some houses it can be a substitution of meat and dry spinach. The processing method is shown in the flow diagram below figure 1.

**fig. 1 Flow chart showing the processing of *Omashikwa***



Omashikwa has the similar processing method as *Mashini Ghamushikwa* which is the traditional fermented milk from Kavango region. This type of milk is prepared by accumulation of milk in gourds for 3 to for days until in ferment. The milk is then shaken to remove the butter which is used as cooking oil.

## **DISSCUSION AND CONCLUSIONS**

Some incentives were given to the interviewee after the interview and when they have given the milk samples. It was found that, a lot of the people were reluctant to give out the milk samples without getting anything in return. Only few fermented milk samples were collected due to the fact that some of the houses they were scared to give their milk as they had doubt about what is the milk going to be used, some they told us that they are startled of the black magic and they believe that this small milk samples will be used against them and their animals using black magic. The other factor that affected the sample size is that there was flood at most of the villages and so, many of the people took their cows to the cattle posts which are kilometers away from their home steads for better grazing.

### **Challenges encountered**

Because this research was a joined venture with the Oshikundu project, time management was a big issues, it was rare to find Oshikundu and Milk in one household, had to share time and also drive long distances looking for one sample. No specific households were identified before the trip, they were picked randomly, it was difficult to get proper household with proper information, and most of the houses were empty or only small children that were found hence, this also contributed on time lost. Other challenge encountered was that people were reluctant to give out samples without any incentives, and some did not want to give out samples with the reason being, they don't know the reason behind the research. Some were so unwilling to give out the samples because of black magic; they think that this was going to be used against them and their cattle herds in black magic. While some were complaining that they feel exploited and no acknowledgement comes their way. Because of the floods, some villages were not accessible.

A total of 13 fermented milk samples were collected and thirteen questionnaires were recorded. One sample was collected in Ohangwena region, six in Omusati region, five in Oshana region and two in Oshikoto region The pH values of the fermented milk falls as days are going and it was found to have shorter shelf life of only 7 days according to the questionnaires. There is no significant difference in the processing method of this sour milk among ethnic groups. All respondents showed that Omashikwa has great social value.

## **RECOMMENDATION**

The following recommendations can be considered:

- The time frame of collecting fermented milk samples was short and not enough; another field trip needs to be made for a better coverage.
- People in rural areas need better understanding and awareness regarding research work and the indigenous knowledge that they have that is needed for the future generation.
- Regular feed backs to the community where research (information) was held should be considered for the benefit of our own people.

## REFERENCES

Akabanda, F., Owusu- Kwarteng, J., Gover, R. L.K., and Tano- Debrah K. (2010). Microbiological Characteristics of Ghanaian Traditional Fermented Milk Product Nunu. *Nature and Science Journal*, 8 (9): 178-187.

Al-Otaibi, M .M, 2009. Evaluation of Some Probiotic Fermented Milk Products from Al-Ahsa Markets, Saudi Arabia. *American Journal of Food Technology*, 4: 1-8.

Bille, P.G., Ozuuko, A.T.R. and Ngwira, T. (2002). Sensory properties of traditionally fermented buttermilk (Omashikwa) processed in Namibia. *The J. of Food Tech. in Africa*, 7(2), 52-54.

Gandhi D. N. (2006). Food and Industrial Microbiology. Microbiology of fermented dairy products. National Dairy Research Institute Karnal-132 001 (Haryana).

Gazzola, S., C. Fontana, D. Bassi, and P.S. Cocconcelli, 2012. Assessment of tetracycline and erythromycin resistance transfer during sausage fermentation by culture-dependent and -independent methods. *Food Microbiology* 30: 348-354.

[http:// www.omusatirc.gov.na](http://www.omusatirc.gov.na). Constituencies of Omusati

<http://www.namibsafari.com>

<http://www.parliament.gov.na/constituencies>

Todorov, S. D. (2008). Bacteriocin production by lactobacillus plantarum ama-k isolated from Amasi, a zimbabwean fermented milk product and study of the adsorption of bacteriocin ama-k to listeria sp. *Brazilian Journal of Microbiology* (2008) 39:178-187



## **Annexes list**

Annex 1 Sample collection form

Annex 2 Sample Questionnaires form

Annex 3 Official letters from MRC-UNAM to Regional council offices

Annex 1

Sample collection form for *Omashikwa*

Region	Village	Date collected	Date of preparation	pH		
				Trial 1	Trial 2	Trial 3

Serial number



**MULTIDISCIPLINARY RESEARCH CENTER (MRC)  
SCIENCE, TECHNOLOGY AND INNOVATION DIVISION  
INDEGENOUS KNOWLEDGE SYSTEMS AND TECHNOLOGY (IKST)  
FOOD PROGRAM**

**Pilot study on fermented milks from northern regions in Namibia/**

**Omapekapeko kombinga gomahini nga ga otekwa monooli yaNamibia**

**MARCH 2012**

**By<sup>9</sup>**

**Lusia Heita**

Name / edhina: .....

Age/ eemvula.....

Gender/ uukwashike kookantu: .....

Ethnicity / uukwamuhoko: .....

Region / village / oshikandjohogololo/ omukunda: .....

Name (milk) / eedhina lyo mahini: .....

Ingredients / (additives) / oshike hashi gwedhwamo momahini longithwa mokuninga omahini ngaka?

.....

Processing methods / omahini ngaka ohaga etwapo ngiini?

.....

.....

.....

..... Preservation method / omukalo gwokupungula:

.....

.....

.....

Shelf life/ omihini ohagakwata ethimbo lyithike peni opo ganginge nai:

.....

.....

Does the milk have Social values?

Yes / eeheno	No / aahawe
--------------	-------------

Reason for choosing that answer / etompelo lyokuhogolola eyamukulo ndjoka?

.....  
.....  
.....

Can anyone drink/ eat this type of milk (i.e. age limit, pregnant, gender)? Keshe gumwe otavulu nga okulya/ okunwa oshikulya shika?

Yes / eeeno	No / ahawe
-------------	------------

Reasons if the answer is NO / eetompelo ngele owahogolola ;ahawe:

.....  
.....

**Thank you for your help / Tangi keyambidhidho lyoye!!!!!!!!!!!!!!**