

The role of milk bars in Nairobi in exposing consumers to milk-borne infections through the sale of naturally fermented milk

M. Mutave^a, T. Lore^c, A. Omore^{b,c*}

^aDepartment of Animal Production, Egerton University P.O. Box 536, Njoro, Kenya

^bKenya Agricultural Research Institute, PO Box 57811, Nairobi, Kenya

^cInternational Livestock Research Institute, Nairobi, Kenya

* Corresponding author email: a.omore@cgiar.org tel: 254 20 4223000 fax: 4223001

Abstract

Survey data and milk samples were collected during November and December 2003 from 47 randomly selected milk bars in Nairobi to quantify the risks of exposure to milk-borne pathogens from soured milk sold in the milk bars. The study assessed the extent of sales of soured milk and the practices (such as heat treatment prior to souring) that may mitigate risks of exposure to milk-borne health hazards by consumers of the soured milk. In addition, further reductions in potential risks were quantified through measurement of the pH attained during souring and duration of the souring. The outcomes compared to established thresholds that affect the survival of the pathogens.

Most (81%) of the soured milk samples had been boiled before souring. The study suggests that levels of acidity attained or duration of souring play a minimal role in reducing exposure to potential milk borne pathogens from the remaining (19%) non heat-treated soured milk. The prevalence of 8.3–16.7% of milk samples not rendered safe by any practice translates to a

potential risk of exposure to milk-borne pathogens of between 30 to 61 times each year, for a daily consumer of soured milk purchased from milk bars in Nairobi.

Introduction

Besides being a potential vehicle for the transmission of zoonoses, milk is a rich source of nutrients and an excellent growth medium for most bacteria found in the environment. Previous studies on milk-borne health risks by the Ministry of Livestock and Fisheries Development (MoLFD)/Kenya Agricultural Research Institute (KARI)/International Livestock Research Institute (ILRI) Smallholder Dairy Project have shown that raw or unpasteurised milk markets dominate in Kenya, with over 80% of milk sales reaching the consumer before any heat treatment such as pasteurisation is applied (Omore *et al.*, 2002).

Though most of the consumer households surveyed in the study by Omore *et al.* (2002) reported boiling purchased raw milk before consumption, thus rendering the milk safe, a small proportion (4%) that mainly consumed homemade fermented milk reported not boiling milk beforehand. Further, 25% of milk traders recorded unsold leftover milk of about 7% of the volume of the previous day's sales, which was thereafter sold as naturally fermented milk. Milk bars form a major channel for the sale of such raw and naturally soured milk.

This study set out to quantify the risk of exposure to milk-borne pathogens from soured milk sold in milk bars within Nairobi. The **specific objectives** were to determine the following: a) the extent of sales of raw milk, b) the extent of sales of non-heat treated sour milk, and c) the extent to which consumers of sour milk bought from milk bars in Nairobi are exposed to milk-borne infections. The latter investigation included quantification of the extent to which exposure to non-heat treated sour milk may be reduced by acidity levels reached or duration of souring.

Materials and Methods

A literature review on the physical survival parameters of milk-borne pathogens was carried out with a focus on pathogenic species of coliforms, staphylococci, streptococci, *Brucella* and *Mycobacterium*. Survey data were thereafter collected during November and December 2003 from randomly selected milk bars in various locations in Nairobi namely, Githurai, Kangemi, Riruta, Kawangware and Kibera. These locations were chosen because they are of relatively high-density populations and have a higher concentration of milk bars than other locations in Nairobi. The questionnaire used to collect the survey data covered background information on the respondents (education, experience, age, gender, etc.), milk procurement and sales, the fate of left-over milk from the previous day's sales, practices such as boiling or pasteurisation before souring, and souring methods.

In addition, soured milk samples were collected from milk bars selling such milk at the time of the visit for measurement of levels of acidity. The pH was measured using pH indicator paper and a pH meter. Potential risks from sales of non-heat treated milk were assessed by comparing acidity survival thresholds of selected milk-borne pathogens as reported in literature to pH attained during souring and the duration of souring. Established thresholds of pH higher than 4.2 or duration less than 66 hours elapsing from the start of souring (Jay, 1992; Minja *et al.*, 1998) were applied in the assessment of exposure to milk-borne pathogens.

Results and Discussion

A total of 47 milk bars were surveyed, 38 (80%) of which sold soured milk. Milk samples were obtained from 36 of the 38 milk bars that sold soured milk at the time of the visit (Figure 1). Of the 36 milk samples, seven (19%) were not heat treated by boiling or pasteurisation before souring, thus posing a potential health risk if some pathogen were present in the milk. The mean

pH was 4.3 (range 3.1–4.7) and mean duration of souring was 41 hours (range 2–168 hours). Of the seven non heat-treated and soured milk samples, six (16.7%) had pH above 4.2, and three (8.3%) had been soured for less than 66 hours. The study suggests that levels of acidity attained or duration of souring play a minimal role in reducing exposure to potential milk-borne pathogens from non heat-treated soured milk. The prevalence of 8.3–16.7% of milk samples not rendered safe by any practice translates to a potential risk of exposure to milk-borne pathogens of between 30 to 61 times each year, for a daily consumer of non heat-treated soured milk purchased from milk bars in Nairobi.

Conclusion and Recommendation

The natural souring of unheated milk as practised in the sampled Nairobi milk bars appears to play a limited role in reducing exposure to potential milk-borne pathogens from non heat-treated soured milk. However, risks of infection from potential milk-borne pathogens are judged to be low to moderate, due to the common practice—by some 81% of milk bars—of boiling milk before souring it. It is therefore recommended that this practice be further encouraged and all milk bar personnel be advised to subject raw milk to effective heat treatment (boiling or pasteurisation) before souring and retailing to consumers.

Acknowledgement

The authors thank the British Department for International Development (DFID) for financial assistance provided through the MoLFD/KARI/ILRI Smallholder Dairy (Research and Development) Project (SDP). The study was conducted at the specific request of the Kenya Dairy Board.

References

Jay, J.M. 1992. Intrinsic and extrinsic parameters of foods that affect microbial growth. In: *Modern Food Microbiology*. New Delhi, CBS Publishers & Distributors. p. 237.

Omore, A., Arimi, S., Kang'ethe, E., McDermott, J., Staal, S., Ouma, E., Odhiambo, J., Mwangi, A., Aboge, G., Koroti E. and Koech, R. 2002. *Assessing and managing milk-borne health risks for the benefit of consumers in Kenya*. Research Report of the MoA/KARI/ILRI Smallholder Dairy (Research & Development) Project. International Livestock Research Institute, Nairobi.

Minja, M. G., Kurwijila, R. L., Mdoe, N.S.Y., Mchau, K.W. and Auerbock, R.M. 1998. Occurrence and survival of *Mycobacteria* species in fermented milk from traditional cattle herds: A case study of Usangu Plains southern Highlands, Tanzania. *Proceedings of the Tanzania Society of Animal Production* 25: 199-202.

Figure 1. Data available from the survey on 47 milk-bars randomly selected from Nairobi

