



Tropentag, September 17-19, 2018, Ghent

“Global food security and food safety:
The role of universities”

Milk Vending Machine Innovation for Retailing Milk: Operational Costs, Consumer Perceived Risks and Milk Quality

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Abstract

This study reports operating costs, consumer perceived risks and quality of milk from vending machines relative to other retailed milk. Data was collected using market and consumer surveys at the milk market outlets in five major towns in Kenya. The operating costs averaged KES 123,200 annually, of which 58.4% was for servicing of the machine, 24% for licensing and permits charged by regulating authorities and 17.5% for water and electricity. Milk vending machine businesses sold between 200 and 1500 litres a day with a retail margin of KES 5 to 10 a litre of milk, generating returns to the business of KES 1,000 to 15,000 a day. For a litre of pasteurised milk, a consumer saves up to 50% as compared to the price of packet milk when purchasing milk retailed from vending machine. A random sample of consumers associating retailed milk with high risks of adulteration, bacterial load, chemical preservatives, antibiotic residues or unhygienic handling were fewer for vending machine (11.1–16.8%) than were for farm milk directly supplied to consumers (7.9 – 38.0%), pasteurised packet milk (11.7 – 30.7%) or mobile trader retailed milk (14.9 – 57.3%). Compliance with microbiological quality was higher in milk samples from vending machined than for milk retailed in plastic containers (74.4 vs 31% in TVC; 79.5 vs 41.4% in TCC). However, milk contamination with aflatoxin AFM1 exceeded Codex standards of 50 ppt for milk from vending machines (120.87 ± 24.63 ppt) while milk from plastic containers (35.61 ± 20.10 ppt) did not. The number of milk samples found noncompliant was higher from vending machines compared to plastic containers (50.0 vs 63.6%). Milk samples from vending machines did not offer better compliance in quality standards over milk from plastic containers in density (100 vs 100%), not fat solids (46.6 vs 41.4%), hydrogen peroxide (92.3 vs 96.6%) or antibiotics presence (96.3 vs 93.1%). Results show that servicing and licensing make up a large part of operating costs but returns to entrepreneurs are positive. Consumers associate milk retailed in vending machine with lower risks than milk retailed directly from the farm, mobile traders or in packets. However, consumers are exposed to the risk of aflatoxin contamination.

Keywords: Aflatoxin contamination, fresh milk, milk marketing, quality standards