MICROBIAL CONTAMINATIONS IN MILK AND IDENTIFICATION OF SELECTED PATHOGENIC BACTERIA ALONG DAIRY VALUE CHAIN IN TANGA , REGION,TANZANIA

Presented by Fortunate Shija at the first international One Health conference of One Health Central and Eastern Africa (OHCEA) held at Addis Ababa, Ethiopia, 23-27 September 2013.

Introduction

- Food-borne diseases are a threat and are responsible for 33-90% cases of mortality to children

- Bacterial milk contamination causes:
  - Milk spoilage
  - Milk-born zoonotic diseases

- Up to 90% diary related diseases are due to pathogenic bacteria from milk

Dairy industry in Tanzania

Unpasteurized milk

Dairy industry in Tanzania

Informal market

Problem statement and justification

- Risks of milk safety hazards in informal market are high and unknown in Tanzania

- Previous studies have been on the specific risks associated with pathogenic microbes along the milk chain (e.g. Swai and Schoonman., 2011,Kaiza et al (2011)

Problem statement and justification

- PCR detection of milk bacterial contaminants is powerful, gives reliable information on pathogens in milk

- Results of the study will be used to improve food safety throughout smallholder and informal milk value chain in Tanzania

Objectives

Main Objective:

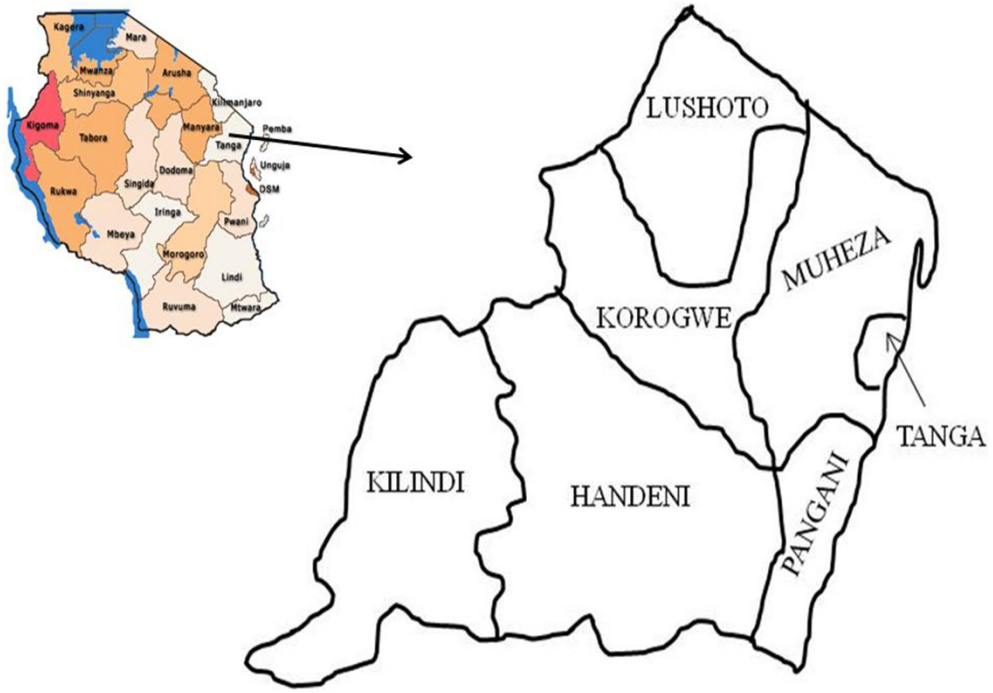
To assess milk handling practices, bacterial contamination and determine selected milk borne zoonotic pathogens along the dairy value chain in Lushoto and Handeni districts of Tanga region

Specific objectives:

1. To assess the possible sources of microbial contamination of milk from farm to consumer
2. To establish total plate count of bacteria and coliforms in milk from Lushoto and Handeni districts
3. To establish the prevalence of *Escherichia coli* 0157:H7 and *Brucella abortus* in milk using polymerase chain reaction

Methodology

Study area-Tanga region –North eastern part of Tanzania



Study design: Cross sectional

Data collection

Questionnaires

93 (65 farmers, 28 retailers) respondents

Sample collection

Milk Samples

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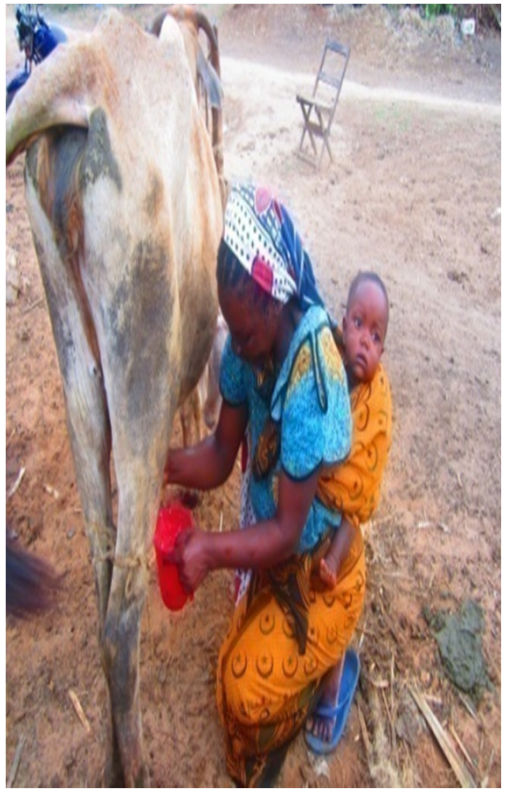
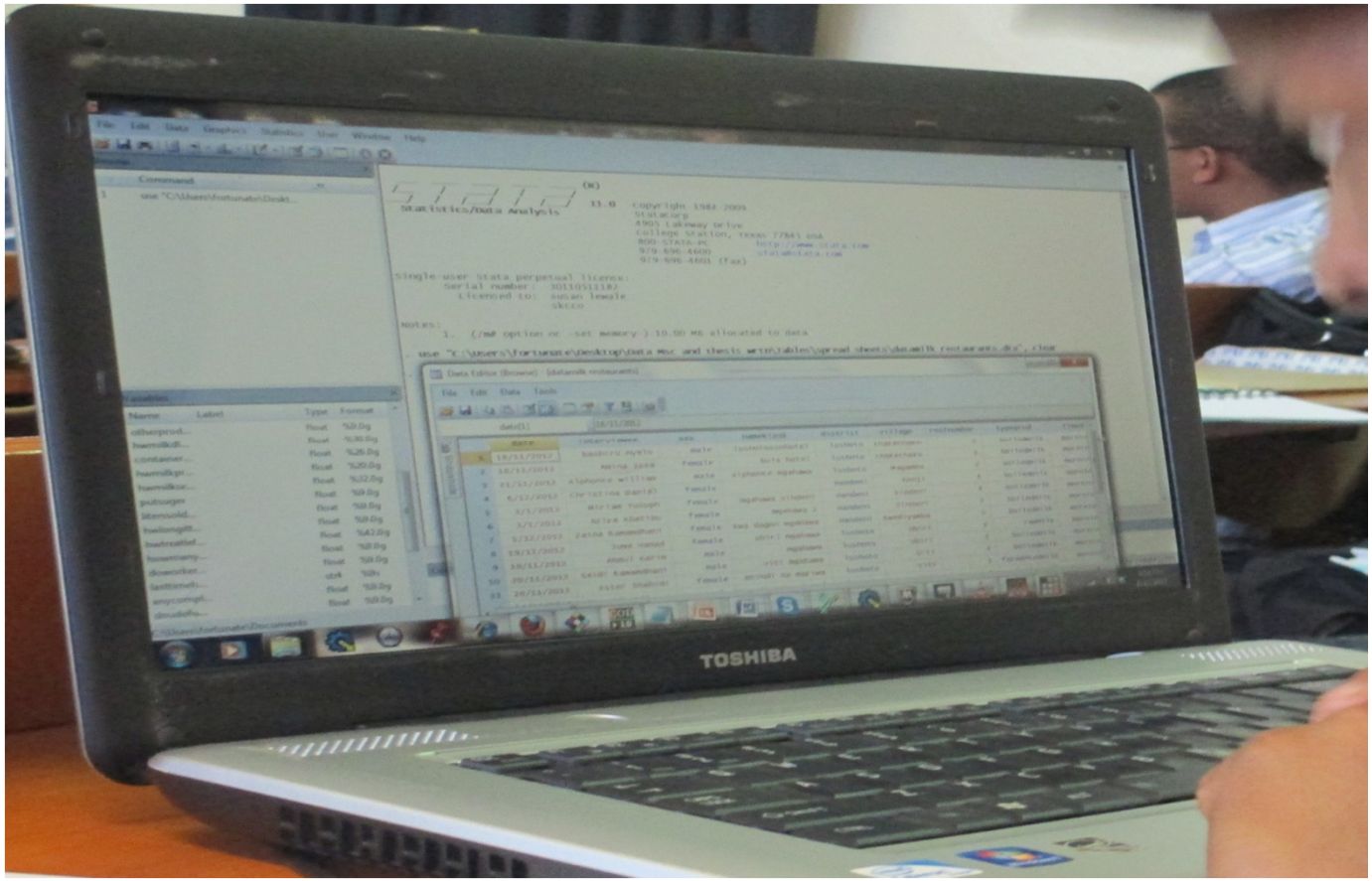


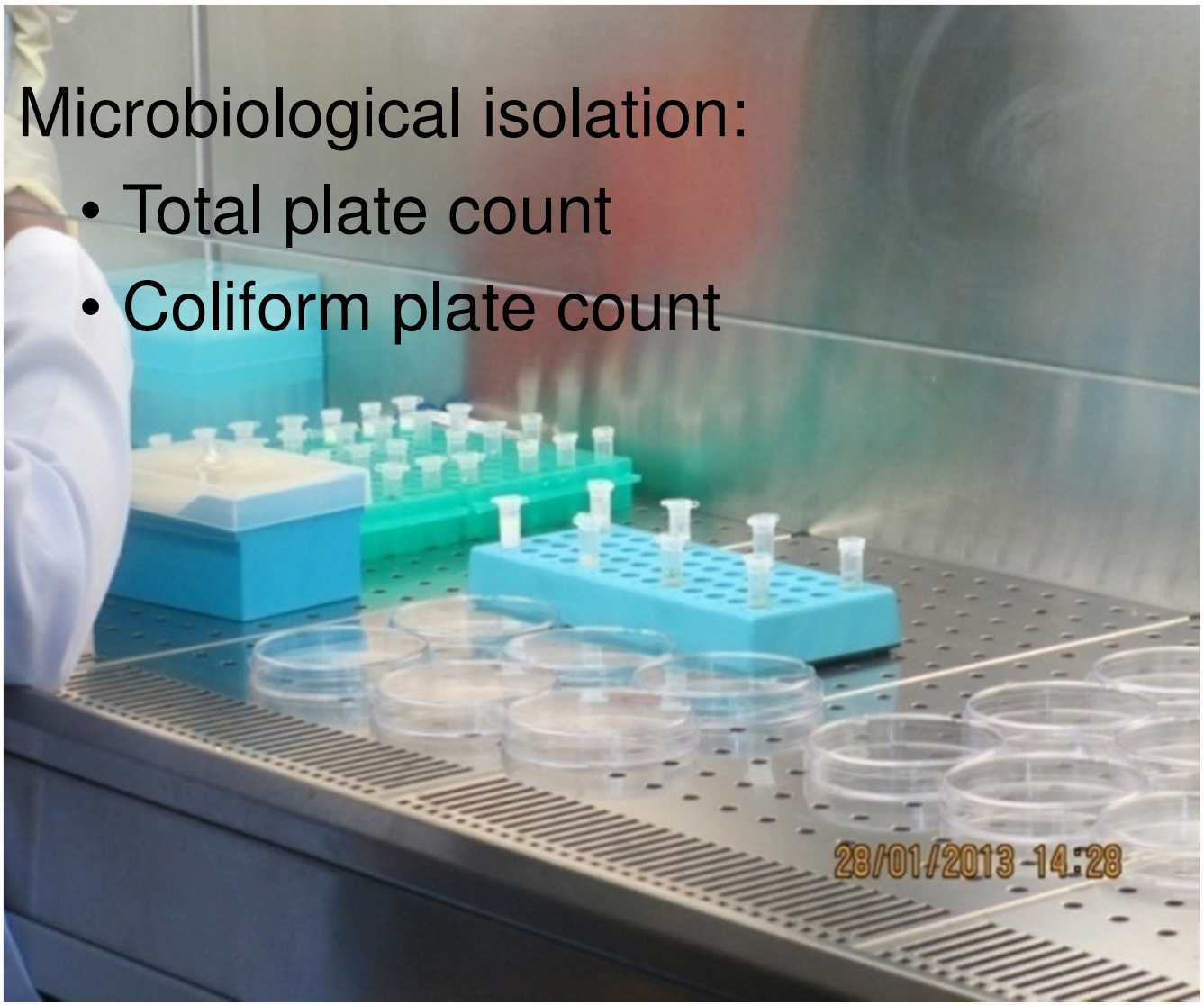
166 milk samples from farmers, vendors, restaurants/kiosks, collection centres and consumers

Statistical data analysis

STATA IC/11



Laboratory sample analysis



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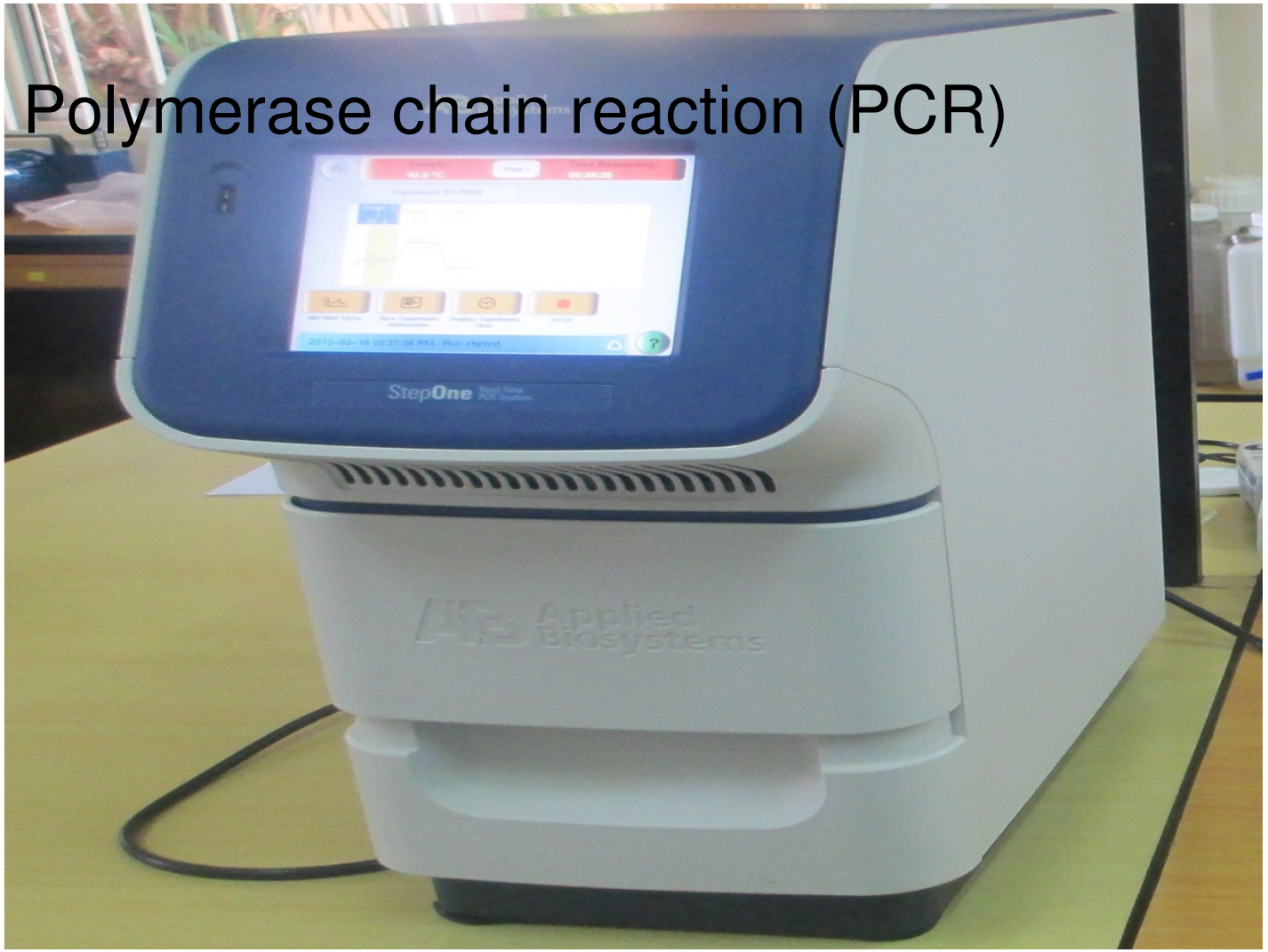


Selected pathogens and Primers

Escherichia coli 0157:H7 (O157-3 and O157-4)

Brucella abortus (BRU P5 and BRU P8)

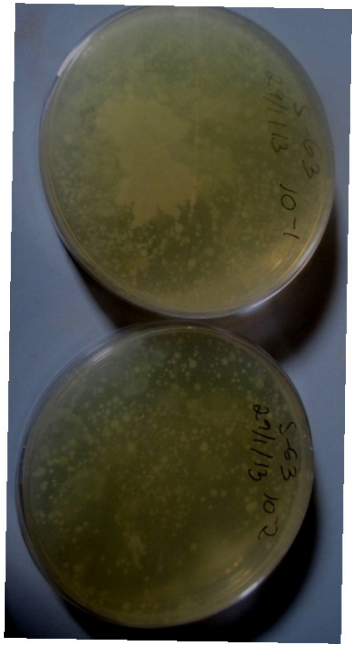
Results

General practices during milking storage and delivery

Variable	Category	No. (%) farmers respondents
Sources of water	Tap	26 (40.0)
	Wells	21 (32.3)
	Dams and/or streams	19 (29.3)
Milking practices	Cleaning animal shed before milking	28 (43.1)
	Wash hands before milking	46 (70.7)
	Wash cow's teats before milking	41 (63.1)
	Wash hands after milking	47 (72.3)
Containers used for milk storage	wide necked aluminium vessel	2 (03.1)
	Wide necked plastick vessel	56 (86.1)
	Used water and oil bottles	6 (09.2)
	Cooking pan "sufuria"	1 (01.5)
Containers used for delivery/transportation	wide necked aluminum vessel	0 (0.0)
	Wide necked plastick vessel	38 (58.5)
	Used water and oil bottles	8 (12.3)
	Cooking pan "sufuria"	3 (4.6)
	Others e.g traditional pots	16 (24.6)
Means of delivery	On foot	37 (56.9)
	By bicycle	9 (13.8)
	By motorcycle	3 (4.6)

Results

Total plate counts and coliform plate counts

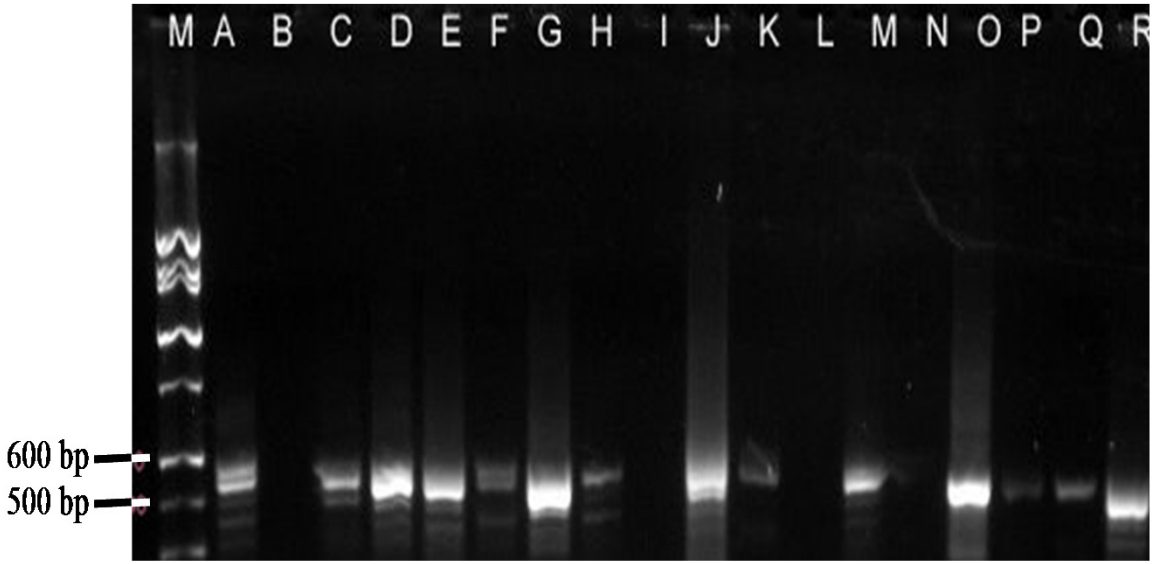


Variable	Observations	Mean (log10 cfu/ml)	Std. Dev (log10)	Min	Max
Total Plate Count					
Farmers	21	5.3	5.4	3.3	5.8
Vendors	5	5.8	5.7	4.6	6.1
Restaurants	7	4.9	4.9	0	5.3
Coliform plate count					
Farmers	22	4.8	4.9	2.5	5.5
Vendors	4	4.8	5.1	3.3	5.4
Restaurants	7	3.6	3.9	0	4.3

Results

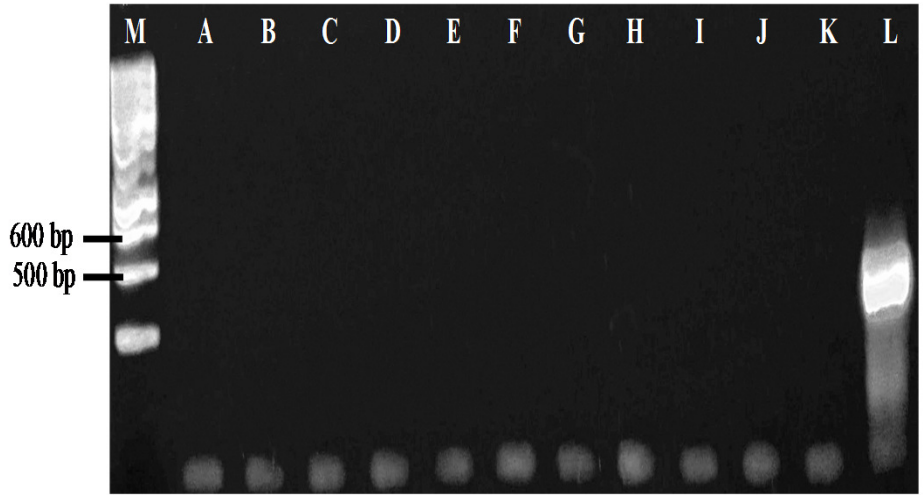
Detection of *B. abortus*

42% positive



Results

Detection of *E.coli*



Risk factors associated with microbial contamination of milk for farmers

	Risk factors		p-value	Mean TPC	Mean CPC	p-value
Milking practices	WHBM	81.8	0.47	2×10^5	5.9×10^4	0.48
	WCTBM	63.6	0.52			0.40
	CAHBM	36.4	0.26			0.31
Types of containers	WNAC	13.6	0.35	2×10^5	5.9×10^4	0.39
	WNPC	72.7				
	Cooking pan "sufuria"	13.6				

Risk factors associated with milk contamination for milk vendors and restaurants

Factors		Vendors	Restaurants	p-value (TPC)	p-value (CPC)
Source of milk	OF		20%		
	MTOF		80%	0.28	
Type of milk	Raw	60 %			
	Fermented	20 %		0.28	0.26
Containers for selling	WNAC		57.1	0.32	0.42
	WNPC		42.9		
How milk is delivered	SSP		85.7	0.32	0.71
	MR		14		
Container used for selling	NNPC	80 %		0.28	0.26
	WNPC	20 %			
	By bicycle	60 %		0.27	0.23
	By motorcycle	20 %			
How customers get milk	SSP	20 %			

OH aspect of the study

- Questionnaire set up
- Involvement of the community
- Findings

Discussion

- Poor hygienic practices at milking and selling places contributes to increase in microorganisms
- Lack of knowledge on zoonotic diseases and their causes in farmers contributed to poor unhygienic practices in milky activities
- The prevalence of *B.abortus* suggests high contamination rate- relates to findings by Schooman and Swai (2005)

Recommendations

- Veterinary/extension services should be provided to livestock farmers on proper animal husbandry and control of diseases

- Responsible authorities must ensure that existing regulations are instituted and where possible there should be a mandatory screening of milk before sales to the public

Recommendations

- Consumer practices, such as milk boiling should be further encouraged

- Further study to relate the findings with human brucellosis in that area should be carried out

Acknowledgement

OHCEA

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SOKOINE UNIVERSITY OF AGRICULTURE
·1984·
ARDHI NI HAZINA

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE


ASANTE SANA