An integrated approach to assessing and improving milk safety and nutrition in the Tanzanian dairy chain

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Tanzania Dairy Value Chain

(Part of the CGIAR Research Program on Livestock and Fish)

- Dairy value chain, one of the 6 value chains under the Safe Food, Fair Food (SFFF) project (ILRI and collaborating institutions)
- Milk is crucial to nutrition and livelihoods of the poor
  Energy, macro and micro nutrients
  Income, sale of milk and milk products
- In TZ, more than 80% of animal-sourced foods (ASF) including milk are marketed informally (similar in many SSA countries)
- Smallholder producers dominate informal markets (99% in TZ)
- No conventional regulation and inspection, thus a potential burden of foodborne diseases and food quality loss in both rural and urban communities.

Milk marketing outlets by smallholder farmers (NBS, 2003)

Milk Buyer	Wet season		Dry season	
	HHs selling Milk	%	HHs selling Milk	%
Neighbours	393,513	86.1	324,045	86.1
Local market	25,227	5.5	19,086	5.1
Secondary market	2,451	0.5	2,173	0.6
Processing industry	6,172	1.4	5,204	1.4
large scale farms	864	0.2	592	0.2
Trader at farm	20,784	4.5	17,713	4.7
Other	7,813	1.7	7,442	2.0
TOTAL	**456,824**	**100.0**	**376,255**	**100.0**
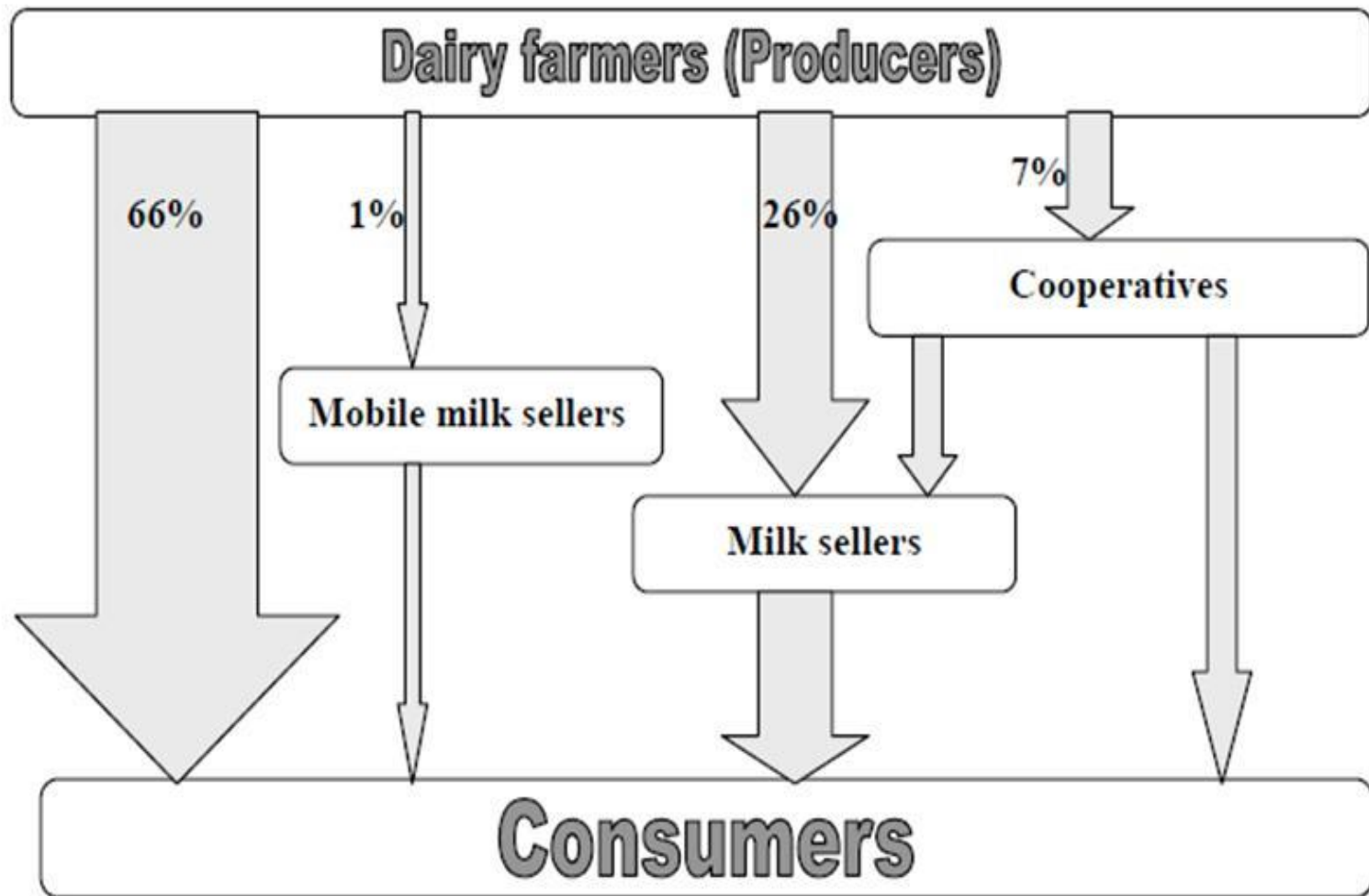
Milk marketing channels in Kasarani.

Source: ILRI

Potential food safety hazards in milk and other ASFs in Tanzania

	Present	Rank	Testing
Adulteration	Yes	6	Regular (milk)
Pathogenic bacteria of animal origin	Yes	1	Episodic
Pathogenic bacteria of human origin	Yes	2	Episodic
Foodborne viruses	Yes	5	Episodic
Parasites	Yes	4	Episodic
Mycotoxins	Yes	8	Episodic
Food additives	Yes	7	Not tested
Pesticide residues	No		
Heavy metals	Questionable		
Chemicals	Questionable		
Antibiotic residues	Yes	3	Episodic
Hormones	No		
Radioactive contaminants	Questionable		
GMO	No		
Deliberate poisoning?	Questionable		

Concern: Food safety in informal markets

No formal inspection of the milk
Products from sick animals may be consumed
In risk: Rural customers, household members themselves,
Consumers in small shops, groceries and supermarkets

Objectives

- Develop methods and approaches for assessing ASF value chains in relation to nutrition and health
- Assess food quality and safety in value chains with high potential for pro-poor transformation

Objective of SFFF: To sustainably increase the productivity of small-scale livestock increase the availability and affordability of ASFs for poor consumers and, in doing so, reduce poverty through greater participation by the poor along the whole value chains for ASFs (FAIR ACCESSIBILITY).

A rapid integrated assessment (RIA) of the dairy value chain started in November 2012

- Training of researchers and enumerators and pre-testing survey in a selected village

- PRA, FGD & 4 questionnaires used

- Producer, Transporter, Retailer and Consumer

- Selected the districts

  - Mvomero (RR, Morogoro region, East)

  - Lushoto (RU, Tanga region, Northern)

Earlier identified using EPI info program by a sister project (MoreMilkIT)

- Selected the wards and the villages
- Five villages in the district, Total 10
  - Wami Dakawa, Lubungo, Kidudwe…
- PRA 15 – 20 gender mixed participants
- Producers and consumers separated
- FGD 6 – 8 nursing mums participated
- Each group with a facilitator, note taker and assistant.
- Questionnaire, plan was 20 respondents
- OK for producers and consumers
- Limited transporters and retailers
- PRA, FGD information draft report in place
- Data have been coded and entered into a computer (SUA and RVC)

Seasonal calendars, dairy production and consumption and times of general food shortage during the year

Pair-wise matrices on constraints, listed constraints on increasing volume or quality of dairy production

Problem-opportunity matrix, previous and potential interventions for the major constraints on production

Proportional piling to assess herd entries and exits, on farms (animals entering and leaving the herd, deaths by causes, diseases)

Knowledge, attitudes and practices (KAP) surrounding food quality and safety

Additional tools were:

Listing, rating and ranking of the role of all ASF in the diet

Chapatti diagram, proximity and importance of sources of dairy products

Flow charts, typical pathway of food preparation and handling between purchase/harvest of dairy products and consumption

Listing and elaboration of the role of ASF in diets of young children.
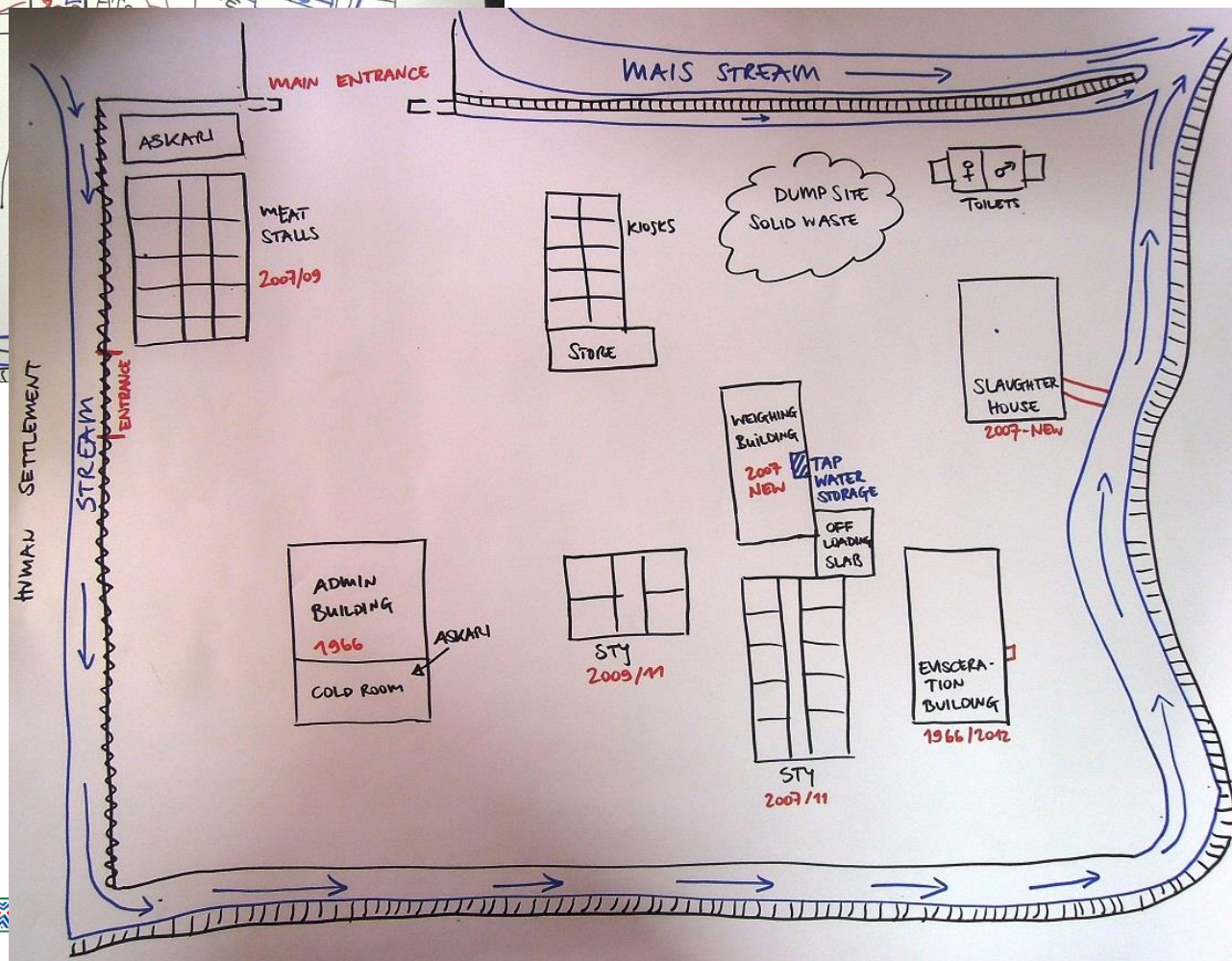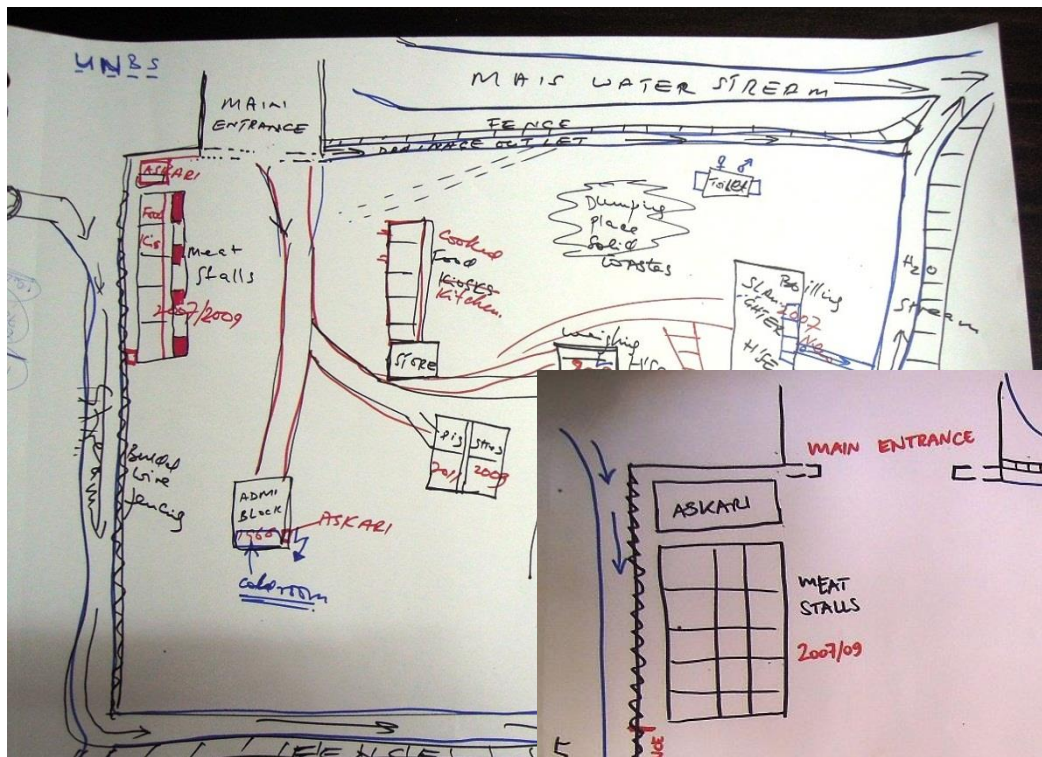
Participatory methods to fill data gaps
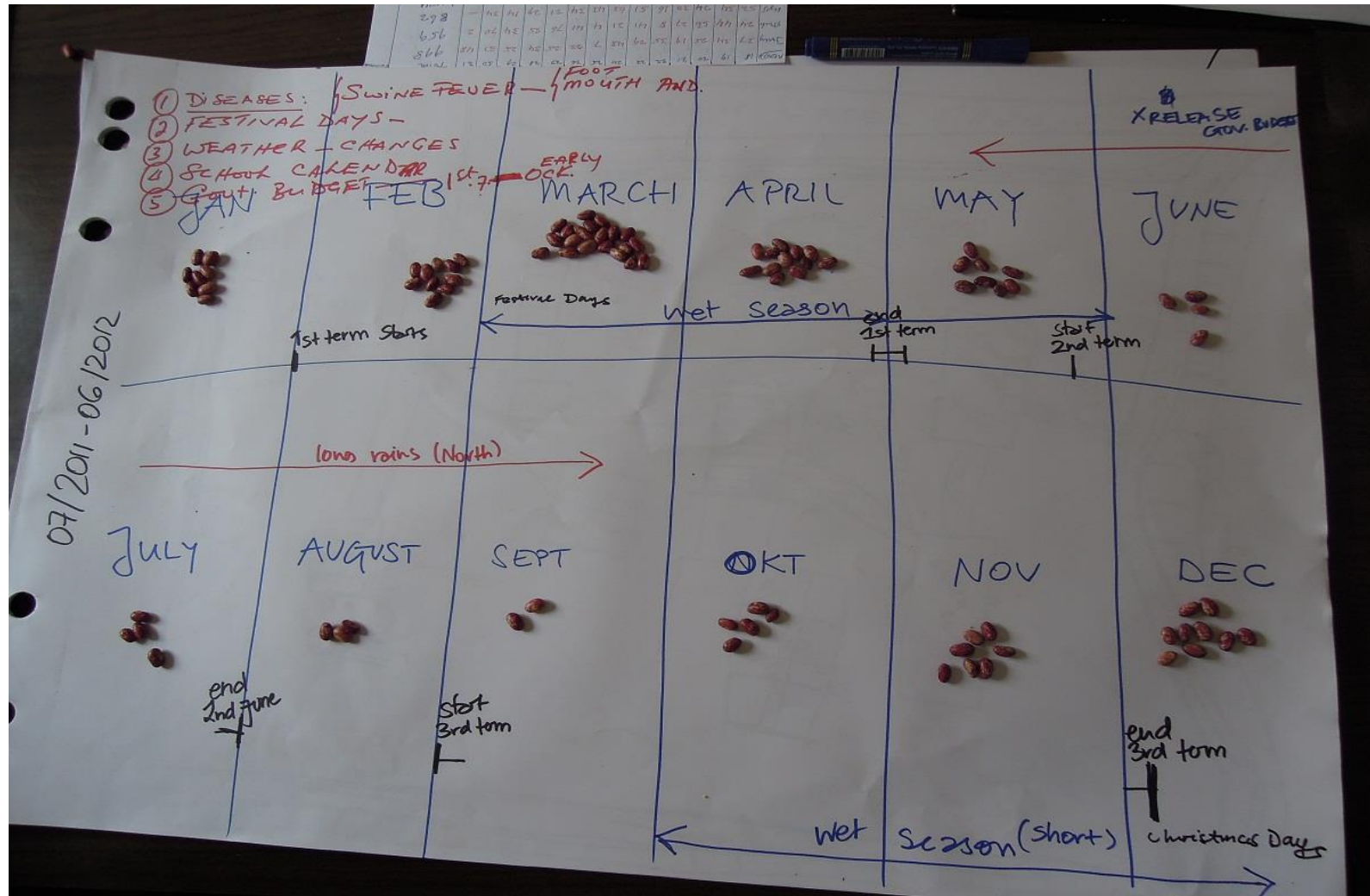
Participatory methods to fill data gaps

Preliminary findings

- Milk production is seasonal and there are variations in gender involvement

- Trading is informal, majority sell to neighbours

- Processing rarely practised (boiling for drinking, fermenting milk practised)

- Unfair consumption (children taking up to two litres of milk/day, pregnant women unlikely to drink fermented milk)

- Producers and consumers understand contamination and pathogens. So, safety concerns is cry of everyone in the VC
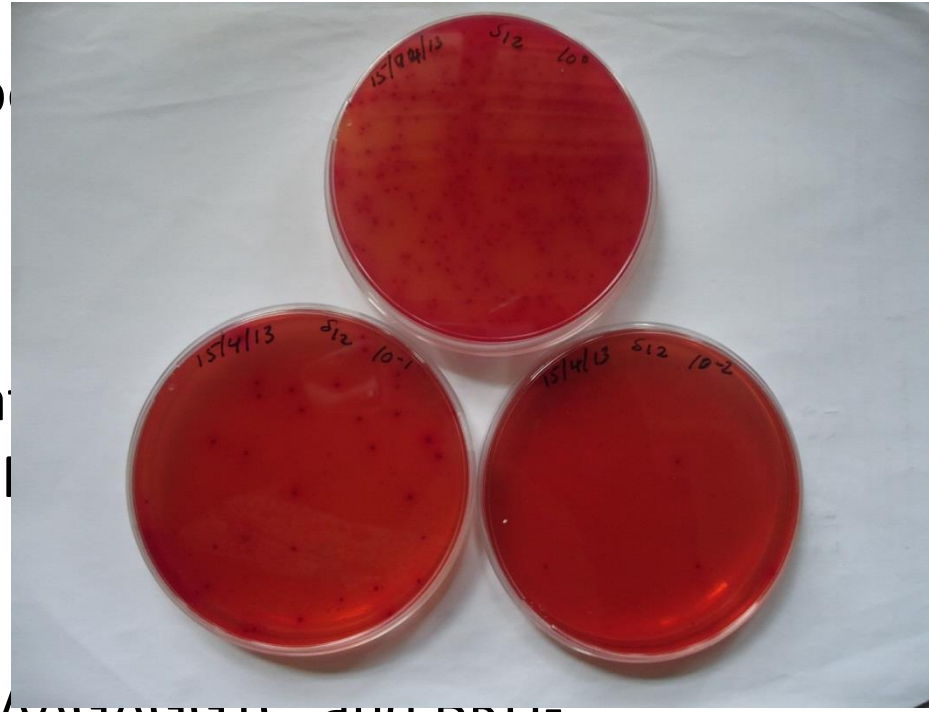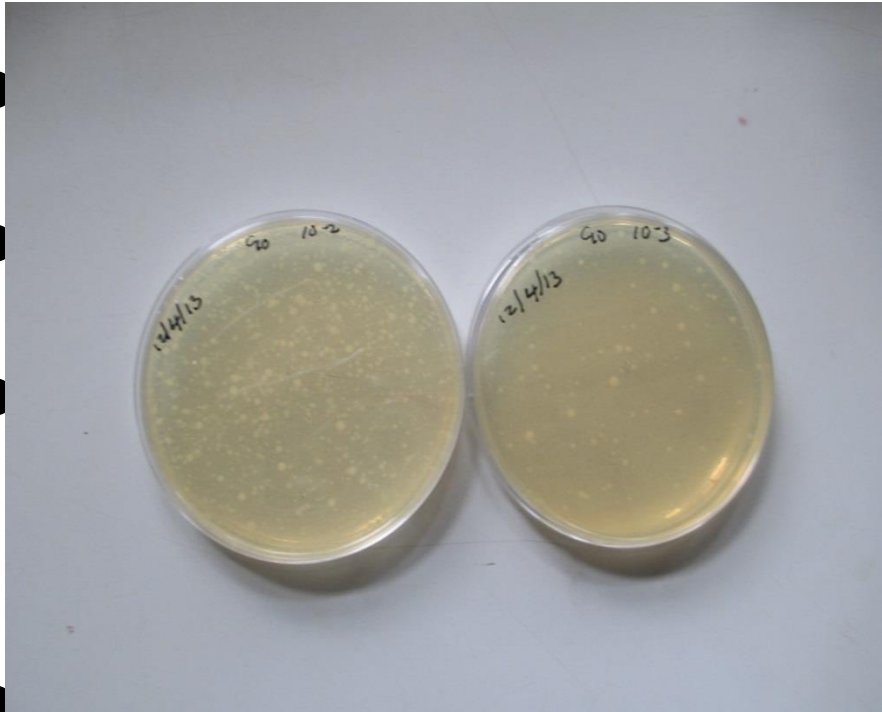
- Primers BRU-P5:TCGAGAATTGGAAAGAGGTC and BRU-P8:GCATAATGCGGCTTTAAGA targeting 16S-23S (Nancy et al., 1996)

- 0157-3: GTAGGGAAGCGAACAGAG and 0157-4: AAGCTCCGTGTGCCTGAA targeting the hlyA gene (Wang et al., 1997)

Total plate and coliform counts and PCR - Tanga

Total plate count

Variable	n	Mean (log 10, cfu/ml)
Farmers	21	5.3
Vendors	5	5.8
Restaurants	7	4.9

Coliform count

Variable	n	Mean (log 10, cfu/ml)
Farmers	22	4.8
Vendors	4	4.8
Restaurants	7	3.6

PCR and sequencing – *B. abortus*

Variable	Both districts (n =87)
Consumers	5
Restaurant	4
Farmers	25
Vendors	4
Total	**37 (42.5%)**

Total plate and coliform counts and PCR - Morogoro

Positive sample for TCC	Mvomero (n=49)	Kilosa (n=30)
Pasteurized milk	11	7
Mean	8.8×10^4	1.1×10^5
Raw milk	12	8
Mean	2.9×10^6	1.3×10^7
Positive samples for TVC	24	16
Mean	6.5×10^4	1.9×10^6

PCR and sequencing – *B. abortus*

Variable	n	PCR +ve	PCR -ve
Farmers	38	4	34
Vendors	26	8	16
Milk selling centers	15	1	14
Collection centers	3	1	2
TOTAL	82	14	68
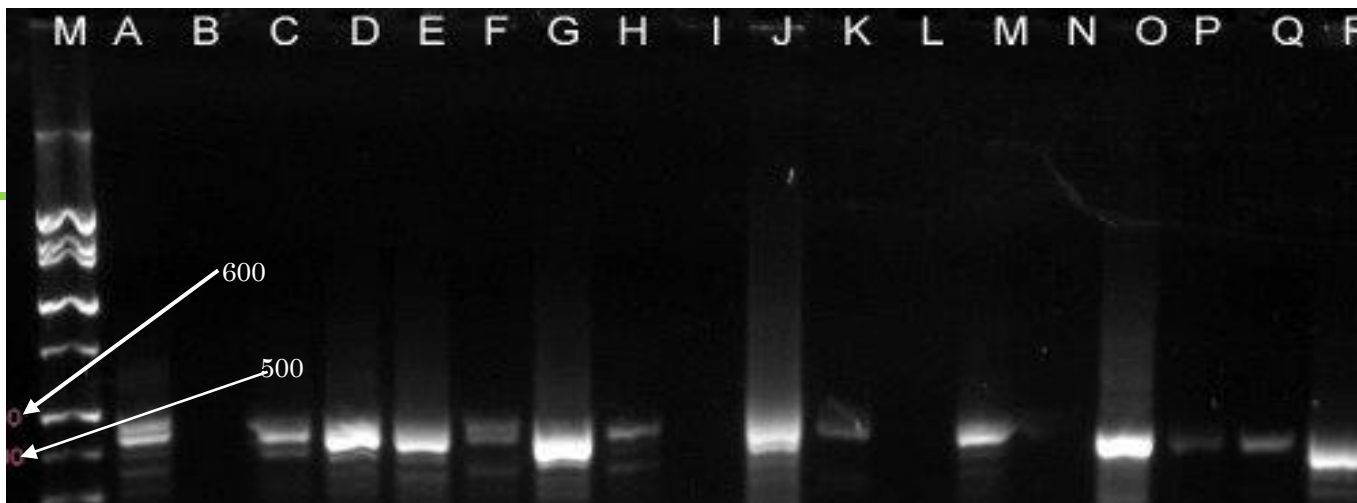
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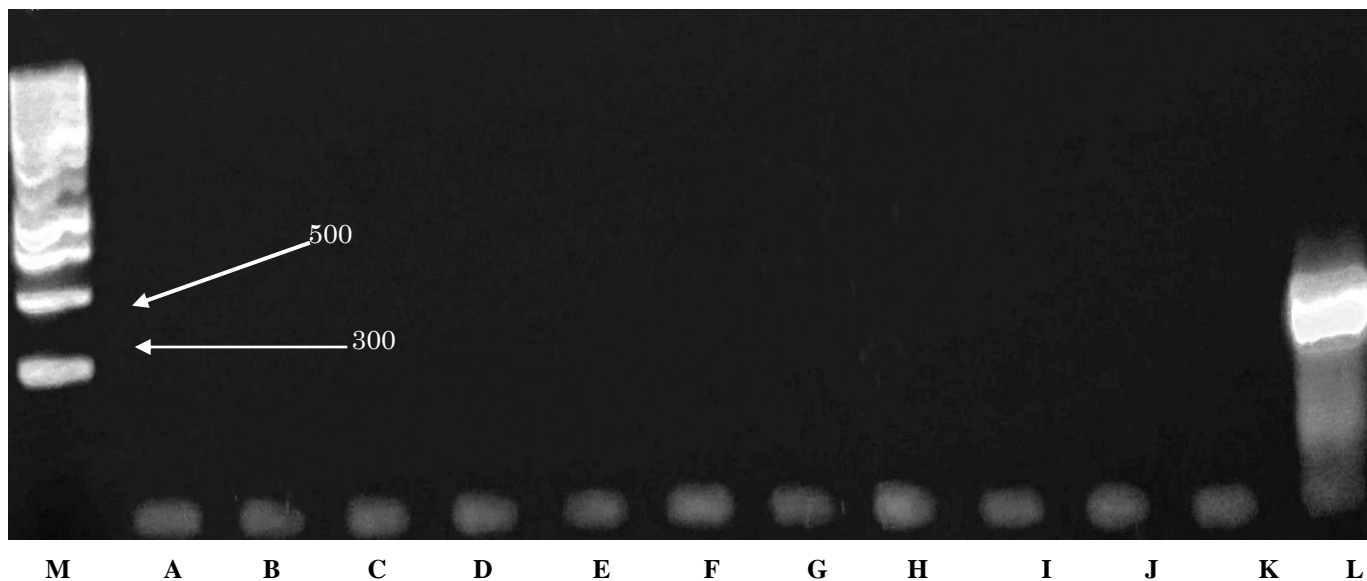
PCR and sequencing – *E. coli*

Conclusion

Taking a One Health and integrated approach to the integrated assessment of the health and nutrition impacts of dairy gives insights into the key constraints to dairy value chains making a contribution to the nutrition and income of poor people in Tanzania

Acknowledgements

For more information, visit
https://safefoodfairfood.wordpress.com & www.ilri.org