Improving handling practices and microbiological safety of milk and milk products in Borana pastoral communities in Ethiopia

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Objectives

1. Assess the knowledge, attitude, and practices of women regarding milk consumption and handling, and the associated health risks focusing on hygiene
2. Generate evidence on the occurrence of *Escherichia coli* O157: H7 and Salmonella in lactating cows and camels
3. Assess the suitability of using different containers (stainless steel, traditional and aluminum) for the preparation of traditional yoghurt related to:
   - bacteria load, pH and titrable acidity of yoghurt
   - social acceptability in using stainless steel container
   - effect of smoking of the containers on microbiological quality of yoghurt

Community tailored training to improve knowledge, attitudes and practices of women regarding hygienic milk production and handling

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Introduction

- Milk and milk products are essential in the diets of the Borana pastoral community in Ethiopia.
- Traditional handling and processing of dairy products using basic equipment and infrastructure coupled with a preference for raw milk consumption pose potential health risks to consumers.

Methods

- Lecture-based interactive training (16 hours in total) on good milk production practices and prevention of milk-borne diseases was tested.
- A total of 120 women were trained and their knowledge attitude and practices assessed at baseline (pre-training), immediately post-training and six months post-training.

The intervention **improved knowledge, attitudes and practices** on milk hygiene compared to the baseline.

The intervention improved adoption of correct practices and having the appropriate attitudes by a lesser amount than anticipated, as several participants still maintained negative attitudes and practices after the training.

Results

- Knowledge score: Pre-training (75.6%), immediate post-training (91.4%), six months post-training (90.0%), the differences are statistically significant
- Attitude score Pre-training (58.8%), immediate post-training evaluation (64.7%), six months post-training (61.4%).
- Correct practices: 49.5% at pre-training to 64.7% six months post-training

Recommendations

- Repeat the trainings and complement them by providing adoption incentives and by creating an enabling environment, with more readily available sanitation facilities and clean water.
- For the sustainable adoption of good hygiene practices, conduct practical training sessions at the homesteads or herding places of the pastoralists.

Research gaps or future opportunities

- Need to study the effect of training on actual microbiological quality and safety.

Occurrence and antimicrobial resistance of milk borne pathogens in milk and feces of lactating cows and camels of Borana pastoral area

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Introduction

- *Escherichia coli* O157: H7 and Salmonella are common milk-borne bacteria causing intestinal and extra-intestinal infections in humans
- Prior to this work, there was no study reporting the occurrence of the pathogens in milk in Borana pastoral area
- The objective was to assess the prevalence of both pathogens in lactating animals and in milk obtained from the animals.

Methods

- Paired fecal and milk samples were collected from lactating cows (n = 150) and camels (n = 92) and cultured for *E. coli* O157:H7 and *Salmonella* identification
- Bacterial isolates were tested for antimicrobial susceptibility using the disk diffusion method.

Considerable share of **milk samples,** especially from **cattle,** were **positive for drug-resistant pathogens** and this could be a significant **public health risk.**

Table 1: Occurrence of milk borne pathogens in milk and feces of cows and camels

Sample	*E. coli* O157:H7-Positive		Salmonella-Positive	
	n	%	n	%
Cow Feces	7	4.5	13	8.4
Cow milk	8	5.2	6	3.9
Camel feces	3	1.9	2	1.3
Camel milk	3	1.9	4	2.5

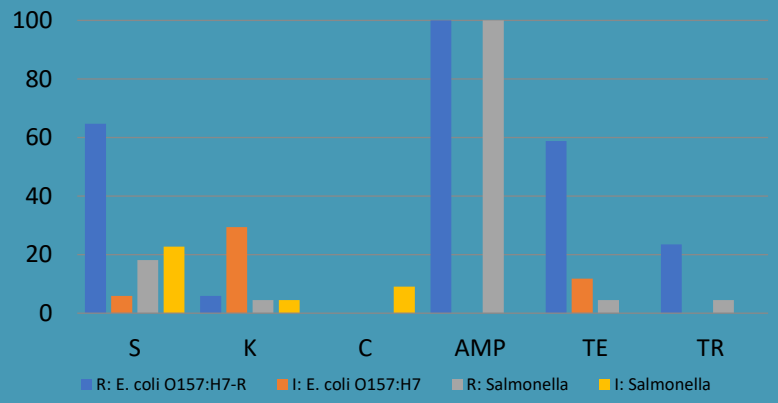

Figure 1: Antimicrobial resistance pattern of bacterial isolates (%)

Streptomycin (S), Ampicillin (AMP), Tetracycline (TE), Trimethoprim (TR), Kanamycin (K), Chloramphenicol (C),

Results

- Escherichia coli O157: H7 and Salmonella were isolated from both feces and milk samples of apparently healthy lactating cows and camels.
- Antimicrobial resistance was highest for ampicillin and multiple resistance reported

Recommendations

- Implement interventions to reduce the potential of milk-borne pathogen transmission (e.g. by promoting boiling milk before consumption)
- Provide targeted education on prudent use of antimicrobials.

Research gaps or future opportunities

- Conduct studies with different species of livestock and also collect environmental samples → provide to a "One-Health" perspective

ETH_Amenu_AAU, Alonso_ILRI (Focus)

Assessment of the suitability of using different containers (stainless steel, traditional and aluminum) for the preparation of traditional yoghurt

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Introduction

- People in Borana pastoral communities handle and process milk and milk products in traditional ways, such as smoking of milk utensils for cleaning and for imparting the desired flavor
- Acceptability of storing milk in alternative containers (stainless steel or aluminum) is unknown

Methods

- Women prepared yoghurt in stainless steel and traditional urns for the assessment of microbiological quality and social acceptability for the stainless steel
- Different tree species were used to smoke the containers
- Total bacteria count, pH and titratable acidity of yoghurt were measured
- Leaching of aluminum from the container into the in raw or fermented milk was determined

No difference in microbial load or quality attributes was based on container type was found.

Strong preference of the pastoralists for milk stored in traditional containers instead of stainless steel.

No difference in microbial load based on wood source for smoking.

Results

- No differences in the effect of smoking on microbial load of yoghurt and the stainless steel/traditional containers
- No difference in microbial load based on wood source for smoking.
- Preference for milk stored and fermented in traditional containers rather than stainless steel due to:
  - ✓ Smoking flavor/taste imparted when using traditional containers
  - ✓ The traditional container can be decorated
  - ✓ Perception that the traditional containers maintained a more conducive temperature for optimal milk fermentation into yoghurt.
- High leaching of aluminum into the yogurt was detected when an aluminum container was used for the fermentation of milk

Recommendations

- Aluminum containers should not be used for yoghurt preparation.
- Hygienic production and consumption practices should be promoted when milk is fermented.

Research gaps or future opportunities

- Different size of stainless and also food grade plastic containers can be introduced and similarly assessed.