

# Occurrence and Antimicrobial Resistance of *Escherichia coli* O157: H7 and *Salmonella* in the Milk and Feces of Lactating Dairy Cows and Camels in Borana Pastoral Community, Ethiopia

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## Introduction

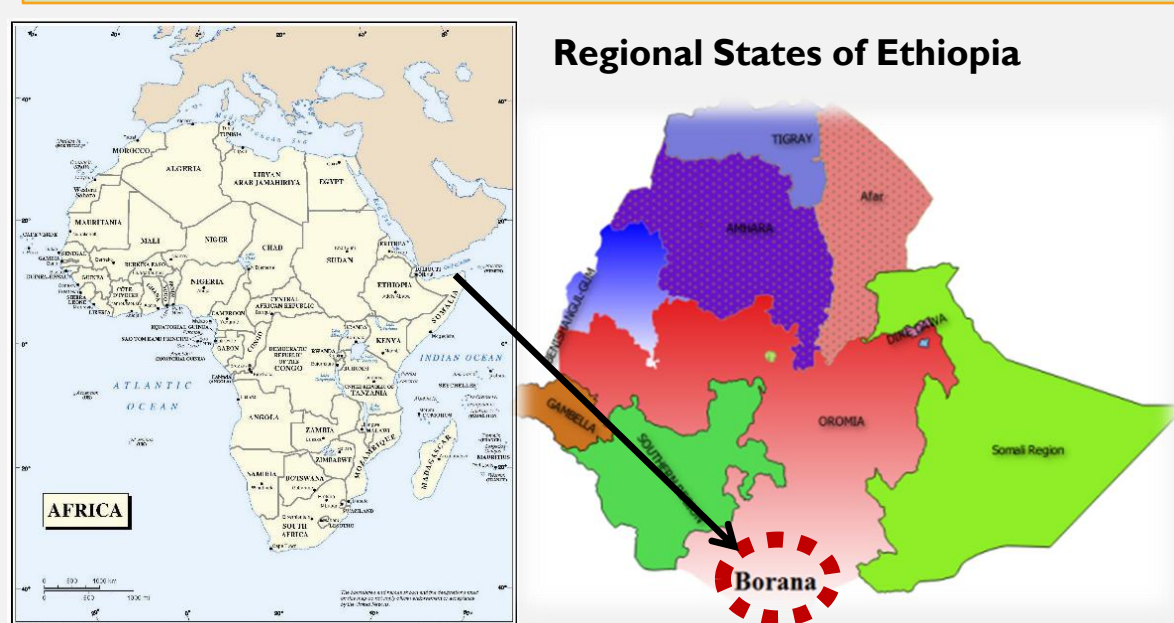
- Milk plays a significant role in human nutrition
- If not properly handled, milk can also be a source of milk-borne microbial infections in humans
- *Escherichia coli* O157: H7 and *Salmonella* are common milk-borne bacteria causing intestinal and extra-intestinal infections in humans
- Studies reporting the occurrence of the pathogens in developing countries like Ethiopia especially under pastoral livestock production system are scarce

## Purpose

To investigate the occurrence and antimicrobial resistance of *E. coli* O157: H7 and *Salmonella* in milk and feces of lactating dairy cows and camels raised under pastoral livestock production system.

## Methods

### Study area



Cattle, camels, goats, and sheep  
 Cow milk is highly preferred for its taste  
 Higher volume of camel milk is appreciated by pastoralists  
 Goat milk is also consumed



Fig 1: Location of study area and major livestock species kept in the area



Fig 2: Sample collection and processing

### Sample collection and processing

Paired fecal (≈15g) and milk (30 ml) were collected from lactating cows (n = 150) and camels (n = 92) and cultured

Pre-enrichment : 10 g feces or 10 ml of milk in 90 ml of buffered peptone water

Immunomagnetic separation using pathogen specific beads

*E. coli* O157:H7 isolated on CHROMAgar-O157 and identified using latex agglutination test

*Salmonella* was enriched in Rappaport Vassiliadis broth and isolated on XLD agar

Isolates were tested against 9 antimicrobials\* by disk diffusion following CLSI protocol

\*Streptomycin, Nalidixic acid, Kanamycin, Gentamicin, Ciprofloxacin, Chloramphenicol, Ampicillin, Tetracycline, Trimethoprim

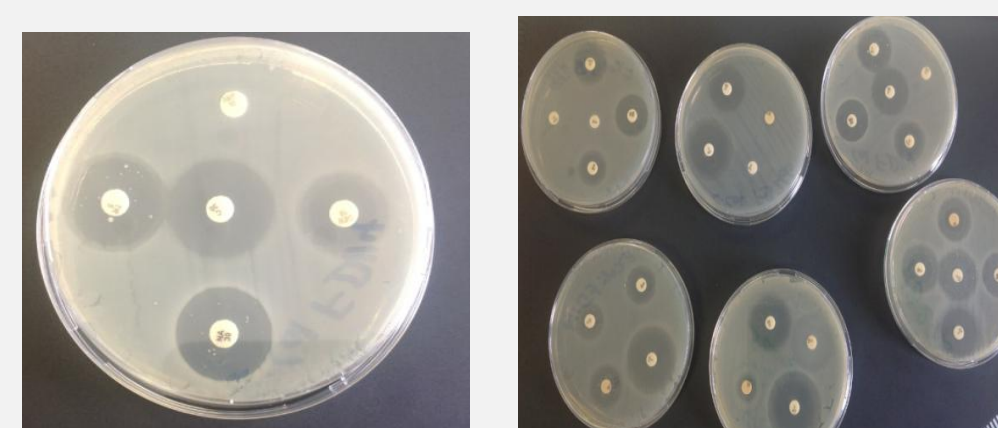


Fig 3: Antimicrobial susceptibility patterns of the pathogens

## Results

Table 1: Prevalence of *E. coli* O157: H7 and *Salmonella* in the feces and milk of cows and camels

Livestock species	Samples	Number tested	<i>E. coli</i> O157: H7	<i>Salmonella</i>
Cattle	Feces	150	4.7	4.0
	Milk	150	4.7	8.6
Camel	Feces	92	3.3	1.1
	Milk	92	0	2.1

### Antimicrobial resistance

All isolates of both pathogens were resistant to ampicillin (AMP)  
 All isolates were susceptible to nalidixic acid, gentamicin and ciprofloxacin

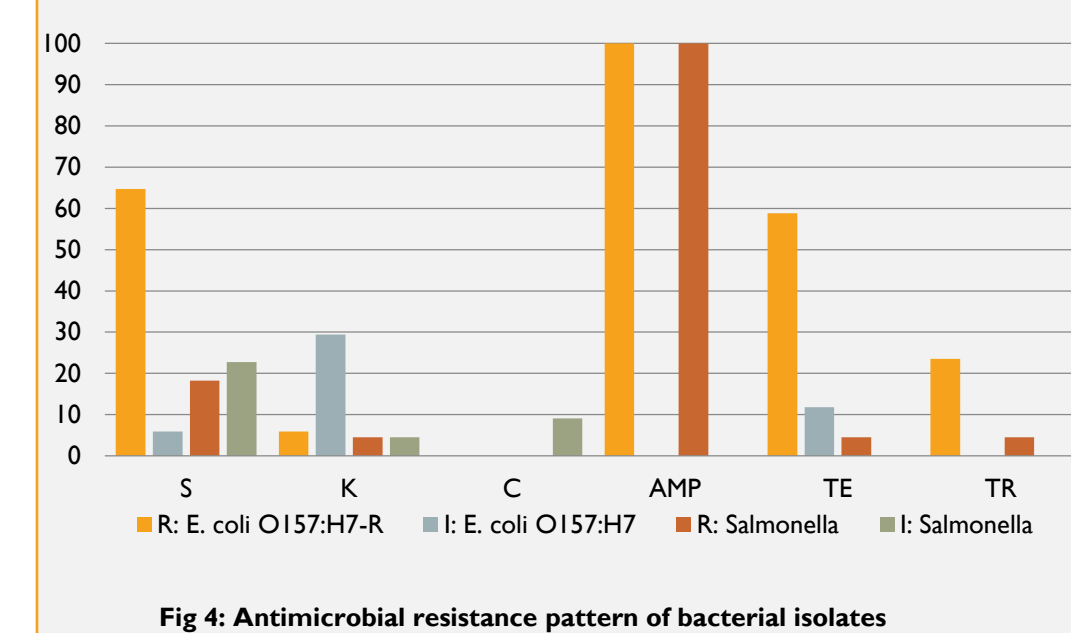


Table 2: Multi-drug resistance of the bacteria isolates

Livestock	Bacteria	# isolates	Resistance profile (number of isolates)			
			one	two	three	four
Cattle	<i>E. coli</i> O157: H7	14	AMP (1)	TE, AMP (2) S, AMP (2)	S, TE, AMP (4)	S, TE, TR, AMP (4)
	<i>Salmonella</i>	19	AMP (16)	TE, AMP (1)	S, AMP (2)	
Camel	<i>E. coli</i> O157: H7	3	AMP (3)			
	<i>Salmonella</i>	3	AMP (1)	S, AMP (2)		

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

## Significance

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

Further studies involving different species of livestock and environmental samples would provide a "One-Health" information

Interventions to reduce the potential milk-borne transmission (e.g. by promoting boiling milk before consumption) and targeted education on prudent use of antimicrobials are recommended.



### Disclaimer

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