

Prevalence of resistant *Escherichia coli* isolated from pasteurised cow milk and its related samples in the Tamale Metropolis of Ghana

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INTRODUCTION

- ❖ Milk is an opaque white liquid produced by the mammary glands of mammals and it is valued as a natural and traditional food (Anonymous, 2016).
- ❖ Milk and milk products are important sources of good quality protein, carbohydrate, fat, the B vitamins and minerals (Gautheron and Lepouze, 2012; Anonymous, 2016).



- ❖ Though milk and milk products provide a wealth of nutritional benefits, raw or processed milk is a well-known good medium that harbours microorganisms such as *Salmonella species*, *Escherichia coli* and *Listeria species* that can pose serious health risks especially to people with weakened immune systems, older adults, pregnant women, and children (Oliver et al., 2005; USFDA, 2012).



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❖ The development of antibiotic resistances by microorganisms has been linked to the use and misuse of antibiotics for therapeutic purposes and for growth promotion.

❖ Antibiotic resistance is a global problem, but demand for antibiotics continues to rise, particularly to treat patients suffering from bacterial infections (Liu et al., 2015).



Objectives

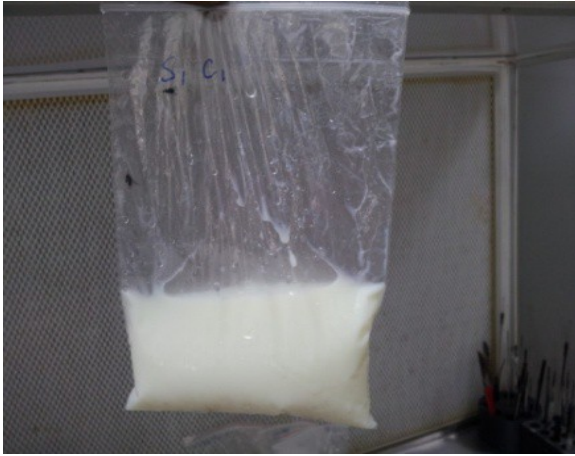
1. To determine the prevalence of *Escherichia coli* in pasteurised cow milk, cow milk products and sellers' hands in Tamale metropolis.
2. To determine the antibiotic resistance of *Escherichia coli* isolated from the cow milk and its related samples.



MATERIALS AND METHODS

- ❖ A total of 300 samples made up of 50 each of pasteurised cow milk, raw 'wagashie', fried 'wagashie', 'brukina', right and left palms of cow milk and milk products sellers were randomly sampled.
- ❖ Six months was used to conduct the experiment; that is, from August, 2015 to January, 2016.2010





Pasteurized cow milk



Raw 'wagashie'



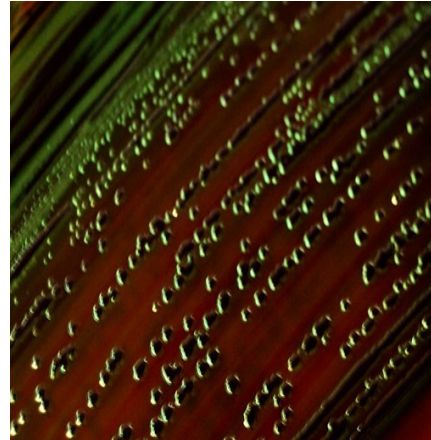
Fried 'wagashie'



'Brukina'



Isolation, confirmation and identification of *E. coli*



Sample



EC broth



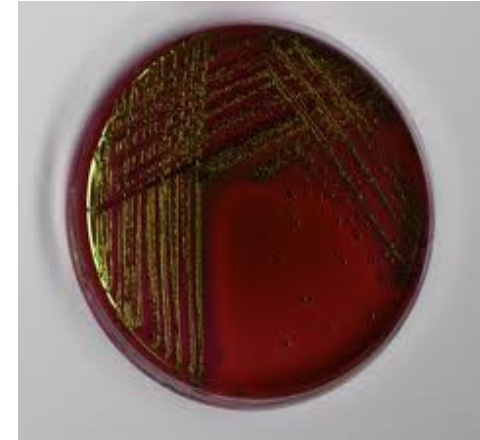
L-EMB and EMB agar



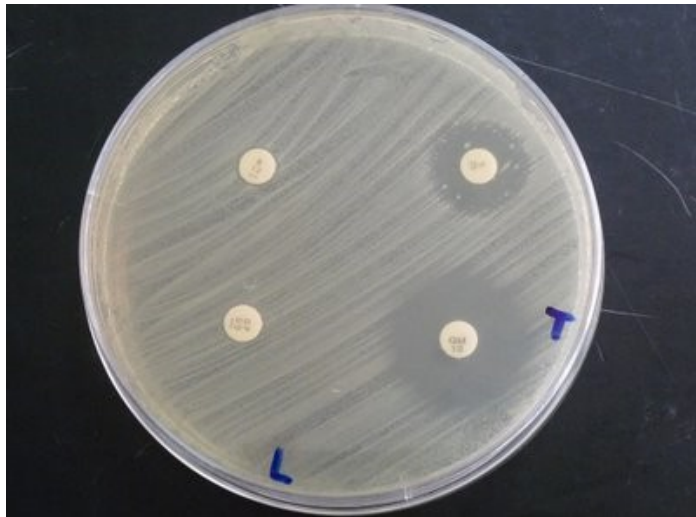
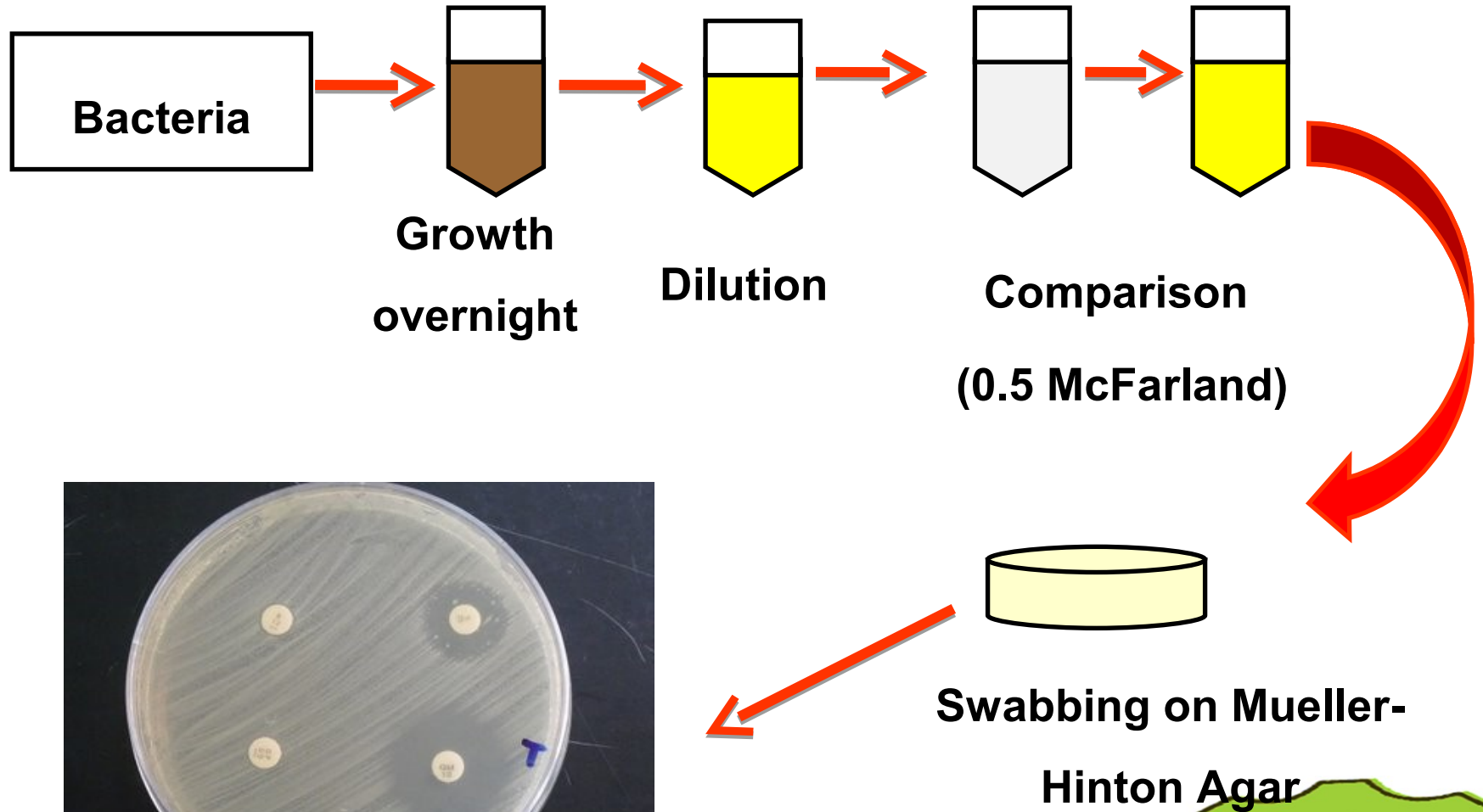
Confirmation by Gram staining and biochemical test (IMViC) and latex agglutination test



E. coli

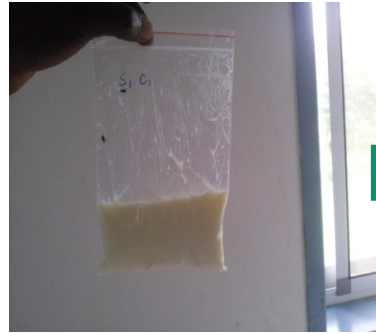


Antibiotic Test, Disc Diffusion Method





Cow milk



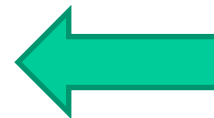
Milk in BPW



Isolate on T-EMB Agar



Isolate in TSB



Antibiotics on MHA



DATA ANALYSIS

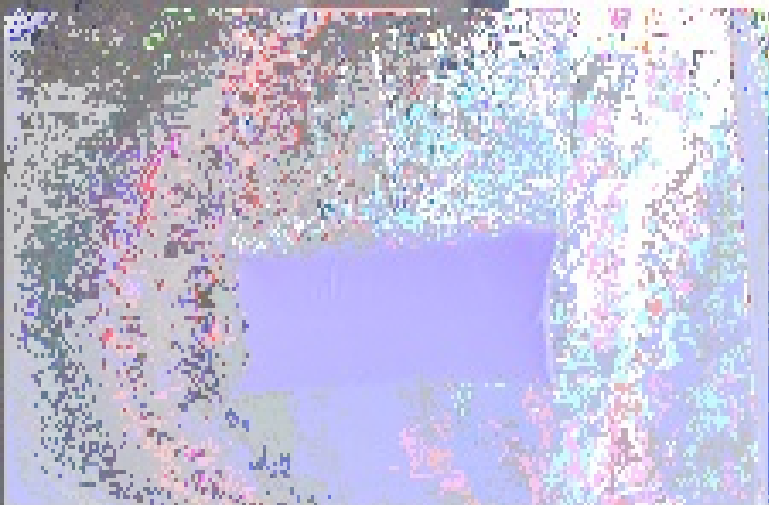
- Prevalence data was analysed using SPSS version 20.
- Antibiotics - Results of the inhibition zones were compared to the Clinical Laboratory Standard Institute (CLSI).



RESULTS AND DISCUSSIONS

Table 1: Distribution of *Escherichia coli* in milk and its related samples

Type of sample	Number of samples tested	Number of samples positive	Percentage prevalence
Pasteurized cow milk	50	39	78.0
Raw 'wagashie'	50	39	78.0
'Brukina'	50	27	54.0
Fried 'wagashie'	50	13	26.0
Left hand	50	6	12.0
Righthand	50	4	8.0
Total	300	128	42.7



Pasteurized milk



Raw wagyu



wagyu



Seared wagyu

- ❖ The prevalence of *Escherichia coli* in pasteurized milk and raw 'wagashie' was statistically higher ($P < 0.05$) than the other samples.
- ❖ The prevalence of *Escherichia coli* in 'brukina' was also statistically higher ($P < 0.05$) than that of fried 'wagashie', left and right hand samples.
- ❖ Left and right hand samples did not differ statistically ($P > 0.05$) from each other.



- ❖ Abike et al. (2015) reported 9.2%, 29.5% and 61.3% prevalence of *E. coli* in raw milk, yoghurt and cheese respectively in Nigeria.
- ❖ A prevalent range of 0%-5.7% (in Europe), 0%-3.8% (in United States), and 0.3% (in New Zealand) for human pathogenic *E. coli* has been reported in raw milk samples (Griffiths, 2010; Soboleva, 2014; Robinson et al., 2014; Lucey, 2015).



• Table 2: Antibiotic susceptibility of *Escherichia coli* in cow milk, cow milk products and hand samples

Antimicrobial	*n/102	R (%)	I (%)	S (%)
Ampicillin (Amp) 30 µg	67	65.70	18.60	15.70
Chloramphenicol (C) 30 µg	18	17.60	23.50	58.80
Ciprofloxacin (Cip) 5 µg	2	1.96	9.80	88.20
Ceftriaxone (Cro) 30 µg	35	34.30	10.80	54.90
Gentamicin (Cn) 10 µg	3	2.90	25.50	71.60
Erythromycin (E) 15 µg	63	61.80	33.30	4.90
Suphamethoxazole/trimethoprim (Sxt) 22 µg	22	21.60	19.60	58.80
Tetracycline (Te) 30 µg	47	46.10	15.70	38.20

Table 3: Antibiotic resistant pattern of *Escherichia coli* isolates

Number of antimicrobial resistance	Number of isolates(%)
Zero	6 (5.9)
One	22 (21.6)
Two	19 (18.6)
Three	29 (28.4)
Four	20 (19.6)
Five	5 (4.9)
Six	1 (1.0)



- ❖ This study revealed that *Escherichia coli* isolates of milk and its related products exhibited 49%, 31% and 20% susceptibility, resistance and intermediate resistance respectively.
- ❖ A study by Khan et al. (2014) involving *Escherichia coli* isolated from milk and milk products revealed an overall resistance of 85.0% and 15.0% susceptibility.



- ❖ From Table 3, 28.4%, 19.6%, 4.9%, 1% of the *Escherichia coli* isolates were resistant to three, four, five and six antibiotics, respectively which is relatively lower to the report by Abike et al. (2015), that 51.4%, 34.2%, 17.1% of *Escherichia coli* isolates were resistant to three, four and five antibiotics respectively.



CONCLUSIONS

- ❖ Milk and its related samples were contaminated by *Escherichia coli*.
- ❖ Pasteurised milk and raw wagashie were the most contaminated.
- ❖ It is therefore expedient that milk handlers, processors and sellers in Tamale and Ghana at large observe good hygienic practices.
- ❖ *Escherichia coli* isolates of milk and its related products exhibited varying percentages of susceptibility, resistance and intermediate resistance.



- ❖ Higher susceptibility occurred for Ciproflaxin and Gentamicin.
- ❖ A higher resistance also occurred for Ampicillin, Erythromycin and Tetracycline.
- ❖ Further research is needed to find out the prevalence of *Escherichia coli* toxins and resistant genes in raw milk and its related products in the metropolis.



ACKNOWLEDGEMENTS



THANK YOU FOR LISTENING

