

Occurrence of Pathogenic Species of *Escherichia coli*, *Listeria monocytogenes*, *Staphylococcus aureus* And *Brucella* In Bovine Raw Bulk Milk In The Selected Milk Sheds Asella Dairy Union And Ada Dairy Cooperatives, Ethiopia

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INTRODUCTION

- Ethiopia is located in the Eastern Horn of Africa with a total area of 1,126,829 km². Estimated population is 89 million; about 85% of the population lives in rural areas. Ethiopia's cattle population is estimated at 53.4 million of which 13.95% dairy cows (CSA, 2011);

- Milk production in Ethiopia is largely from the smallholder farmers in the highlands and the pastoralists in low land areas of the country. However, the production is not market oriented and a minor portion of the locally produced milk enters the commercial sector owing to the marketing constraints and lack of processing techniques suitable for smallholder dairying (Kelay, 2002).

- Spoilage and contamination may occur in the milk chain as a result of poor hygiene, long periods of transportation and lack of appropriate storage facilities. Deficient hygiene has often been considered to be one of the major causes of spoilage of products, resulting in a loss of income, both for farmer and smallholder dairies (Betre, 2007).

- The safety of dairy products with respect to food borne diseases is a great concern, especially in developing countries where production of milk and various dairy products take place under rather unsanitary conditions and poor production practices (Zelalem and Faye, 2006).

OBJECTIVE

Determine the occurrences of pathogenic *Listeria monocytogenes*, *Escherichia coli*, *Brucella* and *Staphylococcus aureus* in raw milk to determine the quality of milk in the selected milk sheds Asella Dairy Union and Ada Primary Dairy Cooperative.

MATERIAL AND METHODS

- Milk sample collection- Three districts (Tiyo, Digeluna Tijo, Lemuna Bilbilo) in Arsi zone and Five *kebeles from Ada'a-Liben district in East Shewa Zone

Target group	Supporting Org.	**PDC	Sample size
*SH producers and dairy farm	Asella Dairy union -Arsi zone	Assela town Gobelencha Del-Besira dairy farm	58
	Ada'a PDC – East Shewa Zone	Kebele 11 Denkaka Babugaya Kebele 02 Lemlem	48

*SH- Smallholder
**PDC- Primary Dy Cooperatives

Sample size determination and sampling methodology

The sample size required was estimated using the formula given by Arsham, (2007) at 5% standard error. The total number of households selected was 100 to increase the precision 106 samples were taken for analysis.

Isolation and identification of bacteria

Listeria monocytogenes:

The identification method used for the species were Rapid *Listeria monocytogenes* (RLM) agar plate and Microgen *Listeria* ID.

Brucella:

Milk ring test (MRT) method was used to identify *Brucella*.

Enterobacteriaceae:

For *E.coli* identification the method used was API 20 E biochemical test kit (BioMérieux, France).

Staphylococcus aureus:

For identification of the species the standard microbiological techniques were used (Quinn *et al.*, 1994).

RESULTS AND DISCUSSION

Escherichia coli

Isolated *Enterobacteriaceae* species in the current study is 37%; *Escherichia coli* (*E. coli*) constituted 19.5% of the *Enterobacteriaceae* species. Lower prevalence (0.75% and 2.2%) reported by Hunderra *et al.*, 2005 and Bedada and Hiko, 2011 in Ethiopia respectively. Asmahan and Warda, 2011 showed higher result, 63% of milk samples were contaminated with *E. coli* in Sudan. Similarly higher result 70% *E. coli* of milk samples were contaminated reported in India (Lingathurai and Vellathurai, 2010).

Listeria monocytogenes

From the 106 milk samples examined 43.1% of *Listeria* species was recovered which is higher compared to 27.4% reported by Firehiwot, 2007 and 26.1% by Simon, *et al.*, 2011 results in Ethiopia. Out of *Listeria* species found 1.2% was *Listeria monocytogenes* which is low compared to the result 16.7% reported in Portugal (Cristina Mena *et al.*, 2004), 13% in Ethiopia (Simon, *et al.*, 2011) and 12.5% in Uganda (Mugampoza, *et al.*, 2011).

Staphylococcus aureus

In the present study *Staphylococcus* accounted 16.7%. Kerro and Tareke, 2003 reported 39.2% *Staphylococcus* prevalence in Ethiopia which is higher. *Staphylococcus aureus* constituted 3.3% the *Staphylococcus* species. Present result is lower than the 44.03%, 36%, 42.1% and 39.1% prevalence reported by Hunderra *et al.*, 2005, Mekonnen *et al.*, 2005, Abera, *et al.*, 2010 and Bedada and Hiko, 2011 in Ethiopia respectively.

Brucella

Present study shows lower *Brucella* prevalence (3.3%) compared to Berhe *et al.*, 2007 reported 42.31%, Kebede, *et al.*, 2008 reported 45.9% in Ethiopia and Junaidu, *et al.*, 2008 reported 32.2% in Nigeria. 2.5% and 15.0% prevalence in Ethiopia is also reported which is comparable with present results by Kassahun, 2004 and Nuraddis, *et al.*, 2010 respectively.

CONCLUSIONS

Generally, results of the current study of microbiological properties of milk indicate that qualities of the milk is poor. This is mainly due to unhygienic conditions of milk production, which in turn might be attributed to inadequate dairy infrastructure coupled with limited knowledge on the hygienic production and handling of milk. To this effect, it is important to give trainings to producers on proper milking procedures, hygienic milk production and general husbandry practices. It is not only important but also necessary to put in place quality standards and quality control systems as well as creating an enabling environment for developing and enhancing knowledge and awareness on hygienic milk production.

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RESULTS AND DISCUSSION

Isolation and identification of bacteria

Type of bacteria	No of bacteria isolated	% prevalence
<i>Enterobacteriaceae</i>	91	37
<i>E.coli</i>	48	19.5
Other <i>Enterob.</i>	43	17.5
<i>Listeria</i>	106	43.1
<i>L. monocytogenes</i>	3	1.2
Other <i>Listeria</i>	103	41.9
<i>Staphylococcus</i>	41	16.7
<i>S. aureus</i>	8	3.3
Non patho <i>Staph</i>	33	13.4
<i>Brucella</i>	8	3.3
Total	246	