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Evaluation of the Safety of Whole Milk in Wolaita Zone, Southern Ethiopia

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Abstract- A study was conducted to evaluate the quality and compositions of whole raw cow milk from farm(producers handling levels) to table(collectors handling levels) in Wolaita Zone of Soddo Town and Kokate Kebele. A total of thirty milk samples were collected from 30 dairy farmers (producers) at Kokate kebele who sold their milk at Soddo town and twenty five whole milk samples were collected from 25 café's and hotels (collectors) at Soddo town using clean test tube. The major components(fat, lactose, SNF, protein, salt and water) and physical properties(density, temperature and freezing point) of milk samples were immediately analyzed using milk analyzer machine. The result showed that the mean content of lactose, SNF, protein, salt, density and Freezing point of milk samples at producers handling conditions (4.71± 0.08, 8.40±0.13, 3.04± 0.05, 0.73± 0.01, 27.29± 0.56 and 0.60± 0.01) were significantly higher than that of collectors levels (3.74±0.15, 6.73±0.26, 2.41±0.10, 0.58±0.02, 21.34±0.93 and 0.43±0.02).

Keywords: *safety, milk, producers, collectors.*

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Keywords: safety, milk, producers, collectors.

I. Introduction

Ethiopia has great potential for dairy development due to its large livestock population and the favorable climate for livestock. Milk and milk products contributes considerably to the household and national economy through income and employment generation. Thus, the dairy sector is one the potential livestock sectors that contributes to poverty alleviation and improves household nutrition in the country (Mohammed *et al*., 2004).

Milk is a very nutritious food that is rich in carbohydrates, proteins, fats, vitamins and minerals which is a major constituent of the diet and is considered essential to the health and well being of the community (Prejit-Nanu and Latha, 2007). The nutritional as well as economic value of milk is directly associated with its solids content. The higher the solids content, the better its nutritional value and the greater the milk product yields. According to O"Connor (1994), the average total protein, total solids, ash, casein and lactose content of milk ranges between 2.9-5 %, 10.5-14.5 %, 0.6-0.9 %, 2.9-5 % and 3.6-5.5 %, respectively. The constituents may vary with breed, type of feed, stage of lactation, season and age of the cow etc. Milk quality is the sum of physico-chemical, microbial and sensory attributes and these attributes may deteriorate by a number of factors such as adulteration, contamination during and after milking and the presence of udder infections (Esron *et al.,* 2005).

Yet hygienic quality control of milk and milk products in Ethiopia is not usually conducted on routine basis. Door-to-door raw milk delivery in the urban and periurban areas is commonly practiced with virtually no quality control at all levels (Godefay and Molla, 2000). Therefore, this study was conducted to support dairy development through evaluating the nutritional quality of whole raw cow milk at producers and collectors handling conditions.

II. Materials and Methods

a) Description of the study area and sampling techniques

The study was conducted at kokate kebele (rural area) and Wolaita Soddo town (urban area) of Wolayta zone, Southern Ethiopia. Wolaita Soddo town is located at a distance of 330km south of the capital, Addis Ababa where as kokate kebele is located at a distance of about 6km north of the capital, Wolayta Soddo. The kebele and town were purposefully selected due to high milk marketing and consumption activities in Soddo town and Kokate kebele is its main milk shed area.

A total of 30 whole raw cow milk samples were collected from 30 dairy farmers (producers) at Kokate kebele who sold their milk at Soddo town and another 25 whole raw cow milk samples were collected from 25 café's and hotels (collectors) at Soddo town using clean test tube. Milk samples were immediately analyzed for their important compositions using milk analyzer machine that was borrowed from Debre Zeit Agricultural Research Center. Therefore, fat%, density, lactose%, SNF%, protein%, water%, temperature, freezing point and salt were determined in both producers and collectors whole milk handling conditions.

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b) Data analysis

Independent sample T-test was employed for analyzing the collected data by using SPSS (version 16) software. Descriptive statistics such as mean and percentages were used to summarize data as required. Probability (P) value less than 0.05 was used to determine the level of significance.

III. Results and Discussion

Table 3.1 : Nutritional composition and physical properties of fresh cow milk samples under different actors

Parameters	Producers	Collectors
Fat (%)	4.12± 0.28 [a]	4.21± 0.34 [a]
Density(%)	27.29± 0.56 [a]	21.34±0.93 [b]
Lactose(%)	4.71± 0.08 [a]	3.74±0.15 [b]
SNF(%)	8.40± 0.13 [a]	6.73±0.26 [b]
Protein(%)	3.04± 0.05 [a]	2.41±0.10 [b]
Water(%)	1.56± 1.31 [b]	18.25±3.20 [a]
Temperature	22.33± 0.29 [b]	22.69±0.40 [a]
Freezing point	0.60± 0.01 [a]	0.43±0.02 [b]
Salt	0.73± 0.01 [a]	0.58±0.02 [b]

Reported values are the mean ±SE (n=3). Means with different letters in the same rows are significantly different (p<0.05).

A study on milk handling in different actors is most important to evaluate the milk safety and quality after milking of cows. The present study described the effect of nutritional composition, safety and quality of whole raw cow milk under different actors such as producers and collectors handling conditions was shown in Table 3.1. The mean fat content was lower in producers (4.12g/100g) handling conditions than that of collectors(4.21g/100g) handling conditions, but statistically the value was not significant. The finding in this study was in line with Jemila G. and Achenef M.(2012). However, the finding disagrees with the report of Cayot(1998) and Kontel (1999) who reported that fat content of the cow milk was 3.90 g/100g and 3.90g/100g respectively. This may be due to differences in breed and other confounding factors (Guetouache M.*etal*.,2014).The mean density of whole raw cow milk samples at producers (27.27 g/100g) handling conditions was significantly higher than that of collectors (21.34 g/100g) handling conditions. This may be due to more water is added to milk samples in case of collectors. However, the present finding at producers handling levels agrees with the findings of Jemila G. and Achenef M.,(2012).

In this study, the mean content of lactose was significantly affected in collectors handling condition. Higher content of lactose(4.71%) was observed in producers level than that of collectors(3.74%) levels. Lactose is the main carbohydrate of milk so it may be used as substrate during the fermentation of milk by lactic acid bacteria at collectors handling conditions. Lactose content at producers handling conditions in this finding is similar with finding of Cayot,1998 and Jemila G. and Achenef M.,(2012) but different at collectors levels.

The solid not fat(SNF) content in producers(8.40 g/100g) levels was higher than that of collectors(6.73 g/100g) handling conditions. This result is agrees with findings of Jemila G. and Achenef M.,(2012) at producers milk handling condition but not at collectors handling conditions. This indicates that whole raw milk may be added with water at collectors conditions.

The protein content of whole raw milk in producers and collectors handling conditions are show in Table3.1. The mean protein level of whole raw milk significantly higher at producer handling condition than collectors handling condition. This indicates that some amount of milk protein is loss in case collectors.

Table 3.1 shows that salt and freezing point of whole raw milk were higher at producers handling conditions than at collectors. On the other hand, the mean value of water and temperature of whole raw milk at collectors handling condition were significantly higher than that of producers handling condition. The mean fat content at both producer and collectors handling condition were not significantly different.

In conclusion, the present result demonstrated that compositions of whole raw cow milk were varies at producers and collectors handling levels. The study indicated that the quality of whole raw cow milk was higher at producers handling levels than collectors handling levels.

IV. Acknowledgements

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