

Full Length Research

Evaluation of improved milk churner in butter making efficiency in Dawuro Zone and Konta special woreda of SNNPR

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In this study traditional and improved milk processing equipment in butter making efficiency in Dawuro zone and Konta special woreda of SNNPR were evaluated. The result of this study shows that improved milk churner is more efficient in butter making and churning time-saving than traditional milk churner in both study areas. Longer churning time was required, and a higher amount of butter yield was obtained in both traditional and improved milk churners in Tocha woreda than that of Konta special woreda. The difference in churning times and butter yield in Tocha and Konta special woreda could be attributed by the difference in churning temperatures, the volume of the churners & fat content of the milk type used. Milk and butter produced in traditional milk churner are more preferred by consumers however, both products produced in both churners were in acceptable range by consumers. This higher sensory attribute scoring for traditional milk churner products could be familiarization of the consumers to products.

Key word: milk, traditional milk churner, improved milk churner, milk processing.

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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 contribute considerably to the household and national economy through income and employment generation. Thus, the dairy sector is one of the potential livestock sectors that contributes to poverty alleviation and improves household nutrition in the country (Mohammed et al., 2004).

The milk sector in Ethiopia is expected to continue contributing to the local and national economy due to the large potential for milk development in the country, overall economic growth in the country, increased urbanization and improved policy environment

(Getachew, and Gashaw, 2001). However, a postharvest loss is one of the major problems on the milk of the dairy sector in the country. In Ethiopia, the milk production system accounts for about 97% of the total milk production in the country where it is difficult to transport the raw milk to the market areas or the processing plants due to poor infrastructure (Staal and Shapiro 1996). Only 5% reaches the terminal market area, and the rest is processed at the farm gate into different dairy products (Mohammed et al., 2004).

Also, there are post-harvest losses associated with poor handling and contamination, low level of technology applied in the market (Felleke, 2003). Efficient processing

apart from extending the shelf-life of milk, add value to products increases income leading to better welfare of dairy producers. In the study area, collecting and processing milk and milk products are mainly carried out by traditional equipment, tools, and methods that take long hours. Therefore, this study was conducted to evaluate the churning efficiency of milk churners in butter making in selected areas of SNNPR.

II. MATERIALS

a) Description of the study area

This study was done in Dawuro zone, Tocha woreda and Konta special woreda. In Tocha Woreda Medanealem and Ediget kebeles were used and in Konta special woreda Amaya 02 and Amaya 03 kebeles were selected in their potential dairy products. Stockholders were selected purposely and trained how to operate improved milk churner during processing with comparing to the local milk churner. Forty female farmers, four woreda livestock experts and leaders, eight kebele livestock experts and leaders participated. Twenty improved milk churners (ten from Melkasa agricultural research center and ten from Soddo rural technology) were provided for forty female farmers who have potential lactating cows in two areas. Then evaluation work was done as follows: collected milk sample divided into two portions, one part churned in traditional milk churner, and another was churned in improved milk churner. Then butter making efficiency of both milk churners was evaluated. Sensory attributes of the products were analyzed by using 9-point category scales Mepba *et al.* (2007).

Data analysis

The data collected were analyzed using SPSS (version 20) 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

A) Evaluation of improved milk churner in butter making efficiency

Ten improved milk churner were purchased from the enterprise that established at Adama under Melkasa Agricultural Research Center with capacity 20 liters and based on dairy farmers preference other ten improved milk churner with capacity 15 liters were purchased from Soddo Rural Technology development are shown in Figure 1, a and b.

Training was given how to operate improved milk

churner during processing with comparing to the traditional milk churner (Figure 2). Forty female farmers, four woreda livestock experts and leaders, eight kebele livestock experts and leaders participated. Twenty improved milk churners were provided for forty female farmers who have potential lactating cows in two areas. Then evaluation work was done as follows: collected milk was fermented for two days and then divided into two portions, one portion was churned in traditional milk churner, and another churned in improved milk churner. Then butter making efficiency of both churners was evaluated. Sensory attributes of the products were analyzed by using 9-point category scales (Mepba *et al.* 2007).

B) Comparison milk churners in butter making efficiency

Milk churning process and efficiency of butter yield and churning time of traditional and improved milk churners are shown in Figure 3a and b and Table 1, respectively.

The fresh milk sample was collected from selected farmers and then fermented. The fermented milk sample was divided into two equal parts. One portion was churned in improved milk churner, and another was churned in traditional milk churner (Figure 3, a and b). The butter yield obtained in both milk churners was weighed using a digital balance as shown in Figures 4 and 5.

The average churning time of improved milk churner in Tocha woreda (35min) was shorter than the average churning time of traditional milk churner (80 min). The average churning time of improved milk churner in Konta special woreda (30 min) was shorter than the average churning time of traditional milk churner (65 min). In the current study, the churning efficiency of improved milk churner is almost twice than the churning performance of traditional milk churner in both Tocha and Konta special woreda. The average churning time required by improved milk churner and traditional milk churner in Tocha woreda is higher than that of Konta special woreda.

The average butter yield of improved milk churner in Tocha woreda (83.3g/l) was higher than the average butter yield of traditional milk churner (66.7g/l). The average butter yield of improved milk churner in Konta special woreda (76.5g/l) was higher than that of the average butter yield of traditional milk churner (58g/l). In the current study, the average butter yield obtained by improved milk churner and traditional milk churner in Tocha woreda was higher than that of Konta special woreda. The difference in churning times and butter yield in Tocha and Konta special woreda could be attributed to the difference in churning temperatures, the volume of the churners & fat content of the milk.



a. Capacity 20liters (Tocha) b. Capacity 15liters (Konta)
Figure 1, a and b. Improved milk churners



Figure 2. Training on traditional and improved milk churners

C) Sensory analysis of processed products

Sensory evaluation is one of the criterion for quality assessment in new product development and to meet the consumer requirements. Any new product must give satisfaction and pleasure to the consumers if it has to be a part of their eating habit Masood *et al.* (2011). Sensory evaluation such as appearance, aroma, taste and overall acceptance of milk and butter processed in traditional and improved milk churners in Tocha and Konta special woreda are shown in Figure 6 and tables 3 respectively. The appearance, aroma, taste and overall acceptance of milk and butter processed in traditional milk churner in

both Tocha and Konta special woredas are more preferred by the panelists than that of milk and butter processed in improved milk churner. Milk and butter produced in traditional milk churner are more preferred by consumers however, both products produced in both milk churners are in acceptable range by consumers. This higher sensory attribute scoring for traditional milk churn processed products compared with improved milk churner processed products could be familiarization of the consumers to products.



a. Traditional milk churner

b. improved milk churner

Figure 3, a and b. Churning process in two types of churners



Figure 4. Products in improved milk churner

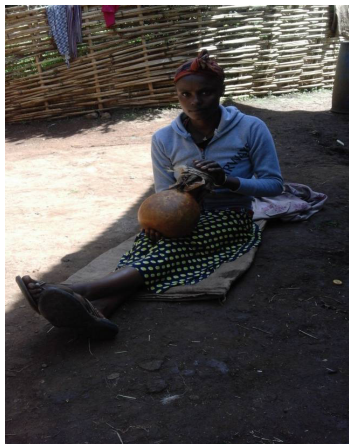
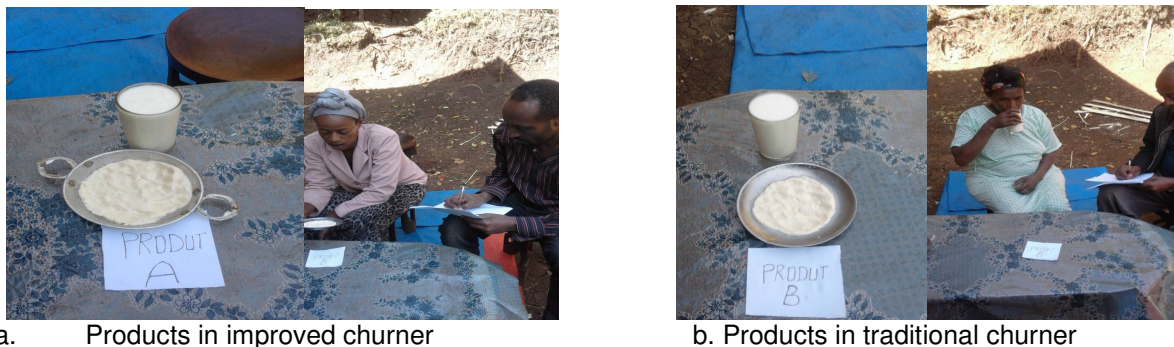


Figure 5. Products in traditional milk churner

Table 1. Churning efficiency of two churners

Parameters	Tocha(n=6)	Konta(n=6)
Effect of churner on time of churning		
Churning time of traditional churner (minute)	80± 2.8 ^b	65± 7.1 ^b
Churning time of improved churner (minute)	35± 1.4 ^a	30± 4.2 ^a
Effect of churner on butter yield		
Butter yield in traditional churner (g/L)	66.7± 1.2 ^b	58± 1.6 ^b
Butter yield in improved churner (g/L)	83.3± 3.7 ^a	76.5± 6.4 ^a

Reported values are the mean ±SE (n=6). Means with different letters in the same column are significantly different (P<0.05)

**Figure 6.** Sensory evaluation of two products**Table 2.** Sensory evaluation of milk and butter processed in two churners

Tocha	Appearance	Aroma	Taste	Overall Acceptability
TCM	8.34	8.44	8.56	8.00
ICM	8.22	6.67	7.15	6.97
TCB	8.78	8.24	-	8.44
ICB	8.55	7.33	-	7.56

Reported values are the mean (n=20).Where TCM=milk churned in traditional churner, ICM=milk churned in improved churner, TCB=butter churned in traditional churner, ICB=butter churned in improved churner

Table 3. Sensory evaluation of milk and butter processed in two churners

Konta	Appearance	Aroma	Taste	Overall Acceptability
TCM	8.77	8.56	8.67	8.22
ICM	8.67	6.88	7.67	7.11
TCB	8.44	8.67	-	8.66
ICB	8.22	7.67	-	7.63

Reported values are the mean (n=20).Where, TCM=milk churned in traditional churner, ICM=milk churned in improved churner, TCB=butter churned in traditional churner, ICB=butter churned in improved churner

IV. CONCLUSION AND RECOMMENDATIONS

In the current study, two milk churners in butter making efficiency in Tocha and Konta special woredas were evaluated. The result of this study shows that improved milk churner is more efficient in butter making and churning time-saving than traditional milk churner in both study areas. Using improved milk churner less churning time is required, and more amount of butter yield is obtained in both areas. Longer churning time was consumed, and higher amount of butter yield was obtained in both traditional and improved milk churners in Tocha woreda than that of Konta special woreda. The difference in churning times and butter yield in Tocha and Konta special woreda could be attributed to the difference in churning temperatures, the volume of the churners & fat content of the milk. Milk and butter produced in traditional milk churner are more preferred by consumers however, both products produced in both churners were in acceptable range by consumers. This higher sensory attribute scoring for traditional milk churner products compared with improved milk churner could be familiarization of the consumers to the products. Hence, improved milk churner should be encouraged for dairy farmers who are using traditional milk churner for butter making.

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