



Research Article

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Assessment of butter making practice in Sidama zone, SNNPR

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Abstract

This study was conducted to investigate traditional butter making practice, consumption and utilization in Sidama zone, Southern Nation Nationalities Peoples Region. A total of 180 households were selected from three agro ecology (60 household per each) where milk processing for butter making has long tradition. The highest and significant difference ($P=0.010$) on butter making practice was observed among three highlands (100%), midland (97%) and lowland agro ecology (88%). Regarding consumption of milk and milk products for household, butter milk and butter were ranked as 1st and 2nd. This was due to most of traditional foods in Sidama zone were prepared with butter and consumed by buttermilk. Besides the women's in the study area process butter primarily for the combined benefit from the sale, for household consumption and as cosmetics which is holding the highest percent (89%) than consumption together with sailing (34%) and consumption alone (33%). In the process of making butter, the processing equipment (Clay Pot) smoked by different plant for the purpose of improving the flavor ranked as 1st and for increased butter yield (2nd rank) and to prolong the shelf life (3rd rank). Woira (*Olea Africana*) is the dominant smoking plant used for fumigation in the three agro-ecologies. In addition to Woira, Tside (*Juniperous Procera*) and Bamboo (*Bambusa Vulgaris*) the second and the third mostly used plants in the highlands of the studied locations respectively. Furthermore, different types of spices were added on butter while cooking. Among the spices, Koseret (*Ocimum Hardiense*) is dominant in the highland and lowland agro ecology where as Korerima (*Aframomum Corrorima*) and Abish (*Trignella Foenum*) in the lowland agro ecology. In the study area most of the respondents make butter from milk of local cow. The milk from exotic breeds was used for raw milk consumption than processing. There is also significance difference in the amount of milk used once for butter making that about 5.5 liter, 5liter and 3.5 liter for highland, midland and lowland agro ecology respectively. Moreover, the interviewed households make butter every 4 days in the highland and 3 day in both of the midland and lowland agro ecology. The finding also figured out that different butter processing constraints in all of the studied districts such as processing utensils easily be broken (clay Pot) (38%), time taking (30%), limited milk yield (20%) and labor taking (16%). Additionally, about 76% of the respondents have limited awareness on improved butter churner and about 17% of the respondents responded inaccessibility as the reason for not utilizing improved churner. Thus, an introduction and demonstration are required to fill the gap of improved butter churner which saves time, reduces women workload and minimize breakage of processing utensil.

Keywords: *Agro ecology, Butter making, Equipment, Processing Traditional,*

Introduction

Ethiopia is believed to have the largest livestock population in Africa. Despite its huge population, the livestock subsector in the country is less productive in general, and compared to its potential, the direct contribution to the national economy is limited [1,2]. Due to the pivotal role that dairy production plays in the economy of the country as well as in the enhancement of the nutritional status of the citizens, development of this sector is crucial. To be effective, efforts are needed to improve the productivity of smallholder dairy production and improve its market orientation by understanding the current and dynamic conditions of production, processing and consumption of milk and dairy products.

In Ethiopia the smaller amount of milk production makes marketable output to become very low. Vast majority of milk produced outside urban centers in the country is processed into milk products at household level using traditional technologies [3]. Other studies also mentioned that milk and milk products are important for family consumption and as a source of income through sale of products such as butter and Ayib (Ethiopian cottage cheese) [4].

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The traditional fermented butter (*kibe*), which is used mainly for cooking, is mostly made in Ethiopia. The Traditional Ethiopian butter (*kibe*) is always made from soured milk (*irgo*). The sour milk is placed in a clay churn or a bottle gourd (calabash). At a churning temperature of 18°C, 67 percent of the fat was recovered using the traditional method and 76 percent using the agitator [5].

Although insignificant amount butter produced in the dairy processing, Ethiopia still imports considerable amounts of butter mainly from Kenya and Europe [6]. Farmers produce butter and ghee mainly on a small scale which is used for domestic consumption and sale. This could be an entry point and good investment opportunities in the dairy industry. Though the amount of butter produced depended on types of cow owned, season, milk management, feed types, lactation length and processing skills, on average 16 liters of milk can produce one kg of butter. In Ethiopia, the traditional processing and marketing of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector. Only 5% of the milk produced is marketed as liquid milk due to underdevelopment of infrastructures in rural areas [6].

The southern nation nationalities people's region (SNNPR) is the second highly milk production potential area next to Oromia region in Ethiopia [7]. It is not only becoming the second milk producing area but also 53.8 % of it is converted to other products rather than consuming it in the form of fresh milk [8]. Therefore, this study investigates the traditional method of butter making consumption and utilization so that to identify and fill the gap in Sidama zone.

Materials and methods

Description of the Study Area

The assessment was conducted in three agro-ecologies; Hagereselem, Dale and Lokabay woredas at Sidama zone representing the highland, the midland and lowland agro-ecology respectively. Hagere Selam is located at a distance of 91kms from Hawassa and 366kms away from Addis Ababa. The highland agro ecology is situated with longitude and latitude of 6°.41'-6°.61'N and 38°.44'-38°.70'E respectively and 1201 to 3000 m.a.s.l elevation. Dale representing the midland agro ecology is located 45km from Hawassa and 320km from the capital city Addis Abeba, and situated with latitude of 4.27° - 8.3°N and longitude of 34°21' - 39°1'E. Its elevation ranges from 1200-3200 m.a.s.l. Lokabaya one of the lowland woredas of the Zone is located at 62 km from Hawassa town (337 km from Addis Ababa). The district is situated with latitude of 6°.42'-6°.83'N and 38°.01'-38°.36' longitude and elevation ranges from 1001-2000 m.a.s.l. [9]

Sampling method

The study was conducted in three agro-ecologies of Sidama zone. In the present study, multi-stage and random sampling method was used. In the first step, districts were stratified in to three groups based on their agro-ecology (lowland, midland and highland). In the second step, from each stratum (agro-ecology), one district was selected by using randomized sampling method; totally three districts were selected. In the same manner, 60 households were selected from each selected district randomly. Thus, a total of 180 households were selected for the survey study.

Results and Discussion

Butter making practice

Butter making is an ancient practice in most parts of Ethiopia. It is always made from sour milk collected in local materials (clay pot, calabash) over a period of few days and allowed to sour naturally. When a sufficient amount of milk has been collected, it is churned by shaking the equipment

backward and forward until butter granules are formed. In this study highest butter making practice was observed in highland (100%) and midland (97%) agro-ecologies than the lowland agro ecology (88%) in the rural areas of sidama zone. The highest butter making practice in the two agro ecologies might be because of highest dairy cattle potential and high feed source due to the nature of agro-ecology. Moreover, the whole Sidama zone has a trend of preparing their food with butter. About 40% of the milk produced is converted to butter [10]. Usually the processing trend in the rural area is low if the area is closer to urban area. The closer the dairy producers for urban centers, they usually do not make butter rather sale the whole milk in urban centers because of the high demand for fresh whole milk.

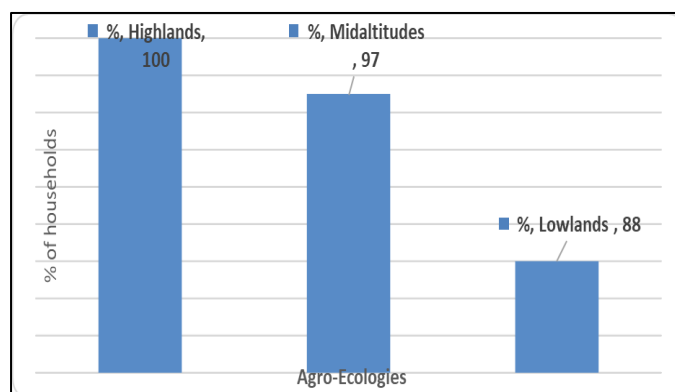


Figure 1: Butter processing practices of households in three agro-ecologies

Consumption of milk and milk products

The consumption trend of milk and milk products varies from place to place depending on their culture in the region. Though, the types of food consumed and prepared varies from place to place in the region, most of the food types in Sidama zone are prepared with Butter (For example called "Bursame", "Omolcho", "Chukame"). In addition to the food types which were prepared by using butter, the food types even not alone consumed but with the butter milk. In this case utilizing buttermilk after consuming the cultural Sidama food is almost similar with taking water after eating food. In the study area due to the above-mentioned reason farmers ranked butter milk as first which is followed by butter. About 88.63 % of milk and 66.95% of butter from production is used for household consumption in SNNPR [11]. For the current study, it is butter milk and butter which is ranked as 1st and 2nd product used for home consumption in Sidama zone particularly.

Table1: Rank of milk and Milk products for HH consumption (Frequency/ Percent)

Products	Rank						Highest Frequency in row	Over all rank
	1 (N, %)	2 (N, %)	3 (N, %)	4 (N, %)	5 (N, %)	6 (N, %)		
Milk (whole)	2 (1)	17 (9.4)	66 (37)	95 (53)	0	0	95	4
Butter	53 (29)	114 (63)	12 (7)	1 (0.6)	0	0	114	2
Butter Milk	118 (66)	41 (63)	16 (9)	5 (2.8)	0	0	118	1
Ayib	0	0	1 (0.6)	2 (1.1)	177 (98)	0	177	5
Yoghurt	1 (0.6)	3 (1.7)	85 (47)	90 (50)	1 (0.6)	0	90	4

Whole milk is ranked as thirdly by majorities of interviewed respondents for household consumption. This was due to the trend of consuming boiled milk by mixing with coffee by all family members in the household. Finally, they ranked yoghurt as fourth, which is usually given for adult men. There is a trend of leaving one milking cow for adults purposely to make yoghurt for consumption when having more than one or two milking cows in Sidama Zone as culture.

Purpose of butter making

Butter making is among common milk processing practice in Sidama zone. About 161 respondents utilize butter for cosmetics purpose from 180 interviewed households (Table 2). The interviewed households mentioned that the one they use for cosmetics purpose is after what is remained from sale and home consumption. This is because the assessment was in rural area and the rural women uses butter for their hair as hair food and there is no other modern treatment used for their hair. Moreover, 59 respondents among interviewed households mentioned that they utilize the butter only for home consumption. That would be when the amount of butter processed is inadequate at household level.

Table 2: Purpose of butter making

No.	Purpose of butter	Frequency (%)
1	For sale only	6 (3)
2	For home consumption only	59 (33)
3	For sale & home consumption	62 (34)
4	For sale, home consumption & cosmetics,	161 (89)

Additionally, about 62 interviewed respondents indicated that they use the produced butter for sailing and home consumption. Unfortunately, there is two method of prioritization, one is sale of butter primarily and consume the remained one for home consumption. The other is sale of butter after household consumption. According to the study conducted in west shewa zone indicated due to small volume of milk production, to increase shelf life of the product, to diversify the product and generate better income by selling milk products are reasons for processing butter in their order of importance [12].

Smoking plant types, purpose of smoking milking equipments and spice types for butter cooking

Smoking milking device is the common practice almost in different parts of Ethiopia. Most of interviewed respondents replied that as smoking have different advantages. The purposes were ranked based on the degree of importance by interviewed households as good flavor, better butter yield, longer shelf life and good taste respectively (Table 3). Different studies reported that purpose of smoking desirable for its aroma [13; 14; 12] and improving its flavor [15; 16].

Table 3: Purpose of smoking butter making utensil

Purpose of smoking processing utensil	Frequency (N=180)	Rank
Good flavor	161	1
Longer shelf life	58	3
Better cleaning	36	5
Better butter yield	60	2
Good taste	38	4

Different types of smoking plants were used for smoking in different agro-ecologies in the study areas (Table 4). Among the different types of smoking plants, Woira (*Olea Africana*) is the most common plant used for smoking milking utensils in the studied agro-ecologies. Similar studies showed that chips of *Olea Africana* used for fumigating milking vessels by burning and smoking in Hawassa area [13; 16]. Tside (41) and Bamboo (17) were ranked as the second and the third dominant local plant types used for smoking among interviewed 60 respondents in the highland agro-ecology. In general, the study confirmed a significance difference at $P < 0.5$ in the utilization of Tside, Woira and Bamboo as smoking plant in the three agro-ecologies. Other studies also mentioned that about 70% of producers smoke their milk utensils with different types of aromatic plants like woira (*Olea Africana*) and Tside (*Juniperous Procera*) [17, 2].

Table 4: common types of smoking plants for milking and butter

Smoking plants (local Name)	Scientific name	Agro-ecology (Frequency/%)			Chi-square value	Sig val
		Highland	Mid-land	Low land		
Tside	<i>Juniperous Procera</i>	41 (95.8)	1(2.1)	1(2.1)	97.776df=2	0.000
Woira	<i>Olea Africana</i>	56 (32)	59(34)	60(34)	11.513,df=2	0.003
Bamboo	<i>Bambusa Vulgaris</i>	17 (89)	2b(11)	-	30.481, df=2	0.001
Gesho	<i>Rhamnus prinioides</i>	2 (100)	-	-	4.045,df=2	0.132

$P < 0.05$ shows significance difference

In the study areas households add different types of spices while cooking (boiling) butter and the types of spices used varies cross different agro-ecologies (Table 5). Accordingly, adding spices is the common practice in lowland (49%) and highland (27%) ago-ecologies. There are different types of spices added for cooking butter. Among those "koseret" (*Ocimum hardiense*) is the predominant spices reported as 40%, 31% and 29% utilization in Lowland, highland and midland agro-ecologies respectively. The "Korerima" (*Aframomum Corrorima*) is reported as second dominant spice used by 24% and 70% of respondents in lowland and midland agro-ecology respectively. The third dominant type of spice added in lowland and midland agro-ecology is "abish" (*Trigonella Foenum Graecum*). The purpose of adding spices is similar like that of smoking practice which is used for flavoring, good taste as well as to prolong its shelf life. The purpose of adding spices during cooking butter is as a means of preservation for traditional butter [4].

Type of milk, frequency of butter making and raw milk time to curdle

Type of Milk for butter making

In the study area almost, all farmers make butter from the milk of local cow. On the other hand, there is variation in milk type from different breeds for butter making. Accordingly, this study identified the milk type from different breeds used to make butter in different agro ecologies. Though exotic breeds like Holstein Friesian (HF) and jersey were used for whole milk consumption, few respondents mentioned that exotic breeds also used for butter making. There is significant ($P < 0.05$) variation in the amount of local milk processed per one session in different agro-ecologies in the study area which is. 5.5, 4.7 and 3.5 liters in the highland, midland and lowland agro ecologies respectively. About 7 to 10 liters of milk is used in a single churn which is higher than the current study [16].

Table 5: Types of spices for cooking Butter

Parameters	N	Agro-ecology (Frequency/%)			Chi-square	Sig val
		Highland	Mid-land	Lowland		
No. HH using spices on butter	180	18 (27)	16 (23.9)	33 (49)	12.32	0.02
Spice types added on butter (With scientific & Amharic names)						
<i>Nigella sativa L.</i> (Tikur Azemud)	67	5 (71)	1(14)	1 (14)	8.02	0.02
<i>Ocimum Hardiense</i> (Koseret)	67	15 (31)	14 (29)	19 (40)	6.41	0.04
<i>Trigonella Foenum Graecum</i> (Abish)	67	1 (4)	7 (29)	16 (67)	9.91	0.01
Aframomum Corrorima (Korereima)	67	3 (6.5)	11 (24)	32(70)	34.9	0.00

Table 6: Amount of milk churned per one session (ANOVA Table)

Breed	Agro-ecology	N	Mean	SD	F	P
Local	Highland	54	5.47	2.91	4.03	0.02
	Mid-land	43	4.69	5.05		
	Lowland	43	3.47	1.70		
Holstein Frisian (HF)	Highland	4	6.50	2.38	0.32	0.61
	Mid-land	1	5.00			
	Lowland	5	6.20	2.17		
Jersey	Highland	0			0.15	0.77
	Mid-land	2	6.00	4.24		
	Lowland	1	4.00	0		

Frequency of butter making and raw milk time to curdle

Table 7 indicates butter making frequency and number of days taken to sour milk for butter making. The result indicated that significant difference among three agro-ecologies for both times taken to sour and frequency of butter making per week. The raw milk souring time for butter making is about 2.3, 2 .8, 3.2 days in lowland, midland and highland areas respectively. This is mainly attached with difference in the range of temperature in the studied agro-ecologies. Although appropriate souring time was mentioned in the three agro ecologies, but the churning was under taken in the third day for the lowland and midland agro ecology where as in the fourth day for the highland agro ecology in the morning time. Under normal storage conditions, milk sours within 4–5 hours [16]. According to the study conducted in highlands of fogera, milk is fermented within 3 to 5 days before it is processed into butter and other products [18]. Similar studies showed fermentation of milk stays between 3 to 5 days in gourd or clay pot equipment [16]. Similarly, about 3.5 day is required the raw milk to sour in west Shewa zone, Oromia region [12]. Moreover, the frequency of butter making depends on the number of days a raw milk takes to sour.

The frequency of butter making per week varies in different agro-ecologies in the study area. This is mainly depending on the area's degree of temperature and raw milk souring time. This study showed that butter is processed twice a week in a high land area (with four days interval) and twice a week in lowland and midland agroecologies but with approximate interval of three day.

Table 7: Butter making frequency and raw milk souring period for butter making

Parameter s	Agro-ecology	N	Min	Max	Mean	SD	F	Si g
<i>No. of days a raw milk to sour to make butter (df=2)</i>	Highland	6	2	4	3.18	0.65	34.4	0.0
	Mid-land	5	2	4	2.75	0.54		
	Lowland	5	1	4	2.30	0.50		
<i>Frequency of butter (per week)(df=2)</i>	Highland	6	1	7	3.55	1.72	11.5	0.0
	Mid-land	5	1	4	2.76	0.65		
	Lowland	5	1	4	2.63	0.59		

Additionally, about 69% of respondents in all agro-ecologies replied that higher butter amount was obtained in wet season than in dry season. This is mainly associated with availability of feed that increases milk yield performance of cows and thereby increased butter amount.

Constraints of Butter processing

Dairy sector is the most important livestock sub-sector for smallholder dairy producers and traders particularly for butter making in Sidama zone, SNNPR. Farmers add value on milk and produce value added dairy products basically to generate income and consume it at home. In the study agroecologies, different factors constrain butter making practice. Thirty eight percent of the respondents reported that breakage of butter

making device (clay pot) as the major challenge and about 31% reported that longer churning time as 2nd challenge.

Table 8: Butter processing constraints

No.	Butter processing Constraints	Frequency/ Percent (N=180)
1	Time taking	55 (31)
2	Low milk yield	34 (20)
3	Processing utensils easily be broken	68 (38)
4	Labor taking	29 (16)

The main problem associated with easy breakage of processing device (clay pot) is, it is made from clay soil. Due to the manufacturing material, the device usually easily broken while churning. About 20% of the respondents replied that low milk production is another constraint for butter processing. The lower the milk yield, they use the milk for raw consumption either by mixing it with coffee or alone. Furthermore, if the processing device serviced for long period, then the efficiency of making butter reduced. Additionally, longer churning time and laborious process was among mentioned constraints. Low milk production, low fat recovery, non-uniform fermentation and delay of fermentation are constraints in the processing and butter production in west shewa zone, oromia region [12].

Utilization of Improved butter churner

About 17% of respondents replied that they have awareness on improved churner. Even those who have awareness are not utilizing the improved churners due to different reasons, according to 8 % and 30% of interviewed respondents report it is unaffordable to buy and inaccessible to get improved churners are among the mentioned reasons respectively.

Table 9: Perception on Improved butter churner

Parameters	No of respondents (N)	Frequency/%
Awareness about improved butter churner	180	31 (17)
Reason for not using improved churner		
<i>Lack of awareness</i>	180	137 (76)
<i>Very expensive to buy (couldn't afford)</i>	180	8 (4.4)
<i>Inaccessible to get (Not easily available)</i>	180	30 (17)

Therefore, by introducing improved butter churner, creating their awareness on the advantages of improved butter churning technology, it is possible to reduce women labor in churning, improve fat recovery and increase the output from the churn.

Conclusion and Recommendation

Butter making is a common practice in different agro-ecologies of Sidama zone, SNNPR. The processing trend is very high though the method of processing is traditional through clay pot. Very few respondents have awareness on improved butter making by using improved churner. In the study districts, raw milk is usually processed for consumption in the form of butter and buttermilk. In Sidama zone as culture, butter and buttermilk are dominantly utilized with traditional food. Most of the interviewed individuals use different types of plants to fumigate their milking, storage and processing equipments. The purpose of smoking in the studied district is to improve the flavor of milk and butter, increase butter amount and also prolong the shelf life of milk and its products. Additionally, the respondents in the study areas faced different constraints on butter processing steps like easily breakage of processing utensil (clay pot), long time taking and being very laborious. Therefore, introduction and demonstrations of improved churners are recommended to minimize workload of women and increase butter making efficiency.

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