COLLEGE OF AGRICULTURE AND NATURAL RESOURCE

DEPARTMENT OF ANIMAL PRODUCTION AND TECHNOLOGY

ASSESSMENT ON TRADITIONAL MILK PRODUCTION AND PROCESSING PRACTICE IN CHEHA WOREDA, GURAGHE ZONE, SNNPRS, ETHIOPIA

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DEPARTMENT OF ANIMAL PRODUCTION AND TECHNOLOGY

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DEDICATION

This work is dedicated to our families for their great sacrifice, ceaseless prayers, support and encouragement.

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LIST OF ABBREVIATION

CSA	Central Statistical Authority
FAO	Food and Agricultural Organization
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
HHs	House Holds
ILRI	International livestock Research Institute
MOA	Minister of Agriculture
RT	Room Temperature
SD	Standard Deviation
SNNPRS	Southern Nations Nationalities and Peoples Regional State
SPSS	Statistical Package of Social Science

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ABSTRACT

This study was conducted in Cheha Woreda, Gurage zone on assessment of traditional milk products and processing. The study included survey on different traditional habit of milk handling and hygienic practice. It was done by taking 60HH by random sampling after purposive selections of three kebeles from which 20 respondents selected from each kebele. Questionnaire was developed and interview used for both primary and secondary data collection. The survey was carried out starting from May 2019 - June 2019. The major finding of the project was the study showed that, from the total respondents 16.7% are males and 83.3% are females. About, 85% were illiterate, the remaining 15% were able to Primary.This study shows that the average milk yield of cow in study area were 1.32 liters per day. The majority of farmer use the material clay pot (100%) to churning cow milk. About 71.7% of the respondents in the study area used milk for processing in to different products and the remaining 28.3% did not process. Almost all (100%) of the farmer has been processed in to different products about yogurt (15%), Cheese (30%), Butter (45%), wehy (10%), of milk products are produced or processed in the study area. There are different additives use for different milk and milk product such as; Nech Azumed, (46.67%) Tikur Azumed, (30%), Kororima, (13.33%), Besobila (6.667%) and Tenadam (3.333%) in the study area to increase aroma and flavors of milk at all.

Key Words; Milk Handling, Milk, Milk Products, Processing.

1. INTRODUCTION

Livestock production contributes 30-35% of the GDP and more than 85% of farm cash income. In this respect, milk production is playing a vital role in the livelihoods of the people of Ethiopia (Belete, 2010). This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country. It holds latent quality for livestock products. Traditional milk production accounts for 98% of the milk production in the Ethiopia (Yonda, 2009). Small holder activity especially on dairy sector can contribute importantly to poverty reduction and nutrition demands of the country (Ahmed *et al*, 2004).

Ethiopia has the largest livestock inventory in Africa total cattle population which is estimated to be about 59. 5 million (CSA, 2016).Out of this total cattle population, the female cattle constitute about 55.38% and the remaining 44.62% are male cattle, of the total female cattle 11.3 million milking cows yields about 3.06 billion liters milk and thus accounting to an average production of 1.37 liters/cow /day.

Ethiopia ranked first in cattle population in Africa, but the dairy industry is not developed even as compared to east African countries like Kenya, Uganda and Tanzania. Regarding dairy production, the national milk production remains among the lowest in the world, even by Milk production systems in Ethiopia may be classified into two broad categories namely: commercial systems which produce milk mainly for market and subsistence systems which produce milk mainly to meet household needs for milk products The rural milk production system is part of the subsistence farming system and includes pastoralist, agro pastoralist and mixed crop–livestock producers, mainly in the highland areas. The system is not market oriented and most of the milk produced in it is retained for domestic consumption (Azage *et al.*, 2013).

The characteristics of milk is deteriorated by various causes and includes; environmental and poor management practices, therefore a decrease in the quality of up to 20–35 % have been reported in Ethiopia for milk and dairy products from milking to consumption (Getachew, 2012). Poor handling of traditional milk and milk products during the processing activities account for a loss of about 40% in terms of quality and quantity (CSA, 2011). In 2002 milk production was estimated at 493 million liters of which below 1% was marketed, 41% was consumed at home and the rest 58% processed into butter and other derivative dairy products. The estimated total population of 3.5 million of dairy cows in approximately 3 million small

holdings suggests that this sub-sector employs many poor farmers in the region who derive a regular source of cash income and balanced nutrition. Although smallholder dairy production accounts for most of the total milk production in the Region, individual cow productivity is low, while the potential for increased productivity per animal is considered to be high (CSA, 2013).

1.1. Statement of the problem

In contrary to the above facts, there is limited knowledge of the dairy production, processing in the Cheha woreda. Milk production holds an important position for economic development and food security in Ethiopia. However, despite its importance in the household and the national economy, dairy management does not follow standard husbandry practices in Ethiopia. Different studies have been done on dairy cattle production system in different areas of the country. But no significant change is there. In fact, it is impossible to increase milk production without first understanding the present production objectives, management practice and constraints of milk production in relation to dairy cattle producer. Therefore, in order to encourage the productive performance, economic return to meet the demands of the people to the dairy products, there is a need of identifying the production systems, constraints that hinder milk production and opportunities that favor milk production. The population of cattle in our country is high. However productivity and production performance of dairy cattle production is low. The study initiated to asses' traditional milk production and processing practice in cheha woreda. With this background and understanding, this study was conducted

1.2. Objective

1.2.1. General Objective

- To asses traditional milk production and processing practice in cheha woreda.

1.2.2. Specific Objective

- To assess different milk products in the study area.
- To assess the milk processing practices in the study area.
- To identify constraints milk production in milking cows in the study area.

1.3. Significance of the Study

As a resource endowment, agro-ecological settings, socio-economic and cultural characteristics of the farming communities vary from one to another, the milk production performance of dairy cattle also very variable. There is limitation of milk production supplied to the consumers in the study area. Therefore, studying the milk production performance of milking cows in Cheha Woreda and analyzing the factors that determine their productivity will provide milk and milk products to the consumers in need and to the smallholders income as well as to country's economy. And the study will also be expected to make its own contribution to the existing body of knowledge in the field of dairy technologies. Moreover, the study assesses and forwards issues with respect to constraints and opportunities of milk production that need government attention and interventions.

1.4. Scope of the Study

This study was focused on the traditional milk production and processing practice in Cheha woreda only in selected three Kebele's due to many limitations such as shortage of time and budget which used to collect the necessary data and lack of enough secondary date from the study area.

2. LITERATURE REVIEW

2.1. Milk Production in Ethiopia

In Ethiopia milk is considered one of the oldest kinds of food and many people depend on its product. The milk production in the country depends on mainly on indigenous livestock genetic resource dominated by smallholder farmers; especially on cattle, goat, camel and sheep. Cattle have the largest contribution (81.2%) of total national animal milk output followed by goat (7.9%), camel 6.3% and sheep 4.6% (CSA, 2009). The productivity of these indigenous breeds was low because of their inherent low genetic capability for milk production and poor management system (Zelalem *et al.*, 2011).

The highly perishable nature of milk coupled with mishandling practice from production up to the consumption stage, the amount produced is subject to high post-harvest loss. The estimated harvest losses of up to 40% of milk and its derivatives in Ethiopia have been reported from milk to consumption (Getachew, 2012). According to (FAO, 2004). the value of annual milk and milk product losses mainly attributed to mishandling in the dairy chain from farm to fork .These include contamination during milking and further handling coupled with storage time temperature before consumption, deliberate adulteration of milk, absence of substandard handling, transportation and distribution system, inefficient processing technology, inadequate fresh milk outlet and spillage loses during milking (Zelalem *et al.*, 2011).

2.2. Overview of Dairy Production Systems in Ethiopia

2.2.1. Rural milk production system

The traditional smallholder system represents the rural milk production system and accounts for about 97 percent of the total national milk production and 75 percent of the commercialized milk. This sector is largely dependent on the indigenous zebu breeds of low productivity, which produce about 400–680liters of milk/cow per lactation period (Zelalem *et*

al., 2011). Rural dairy system is part of the subsistence farming system that contribute up to 98% of the total milk production of in Ethiopia, and includes pastoralists, agro-pastoralists, and mixed crop–livestock producers (Land O'Lakes, 2010).

Milking cows in the traditional sector have an average lactation length of 190 days and an average milk yield of 1.9 liters/day. Although this sector is largely based on indigenous breeds of low-producing native cattle, some progressive small-scale farmers in the various milk sheds are now maintaining cross-bred cows that are capable of producing 800 to 1200 liters of milk/cow/lactation and sell milk to co-operative societies and commercial milk collectors (Getenet, 2009).

The highland smallholder milk production is found in the central part of Ethiopia, where dairying is nearly always part of the subsistence, smallholder mixed crop and livestock farming. Local animals raised in this system generally have low performance with average age at first calving of 53 months, average calving intervals of 25 months and average lactation yield of 524 liters (Zegeye, 2003).

The majority of milking cows are indigenous zebu breeds with low production performance. Cows had three to four calves before leaving the herd at 11-13 years of age. The highland mixed farming milk production is the predominant milk production system accounting for the major part of the 97% milk produced from indigenous stock. Milk from the traditional sector is produced mainly for subsistence farm household requirements.

The average cattle herd size is 5.34/household, which is larger than cattle herd sizes in both urban and peri-urban areas. Out of this herd size, 1.87 consists of local cows and the rest represent other categories of cattle such as oxen, heifers, bulls and calves. Very few crossbred cows are kept in the rural dairy system. The rural dairy system focuses on butter production rather than fluid milk. Animals are kept in open kraals during the night and left on open grazing fields (Girma, 2014).

Natural pasture, crop residues, stubble grazing were listed as major feed resources, with minimal contribution of improved forage and local beverage by-products (Diqi or atela) (Gebrekidan et *al.*, 2010). Green grass and concentrates such as *Nug*-cake and wheat bran are provided as supplements to lactating cows, fattening animals, ploughing oxen and to donkeys when they are at work. Breeding takes place through natural mating using local bulls. About 6% fresh milk is sold to neighbor hoods and the remaining 94% is either home consumed or processed into butter, local cheese (*ayib*) and whey of which 20% is sold (Girma.,2014). This indicates that fresh milk and butter sales contribution under rural dairy is not a priority; however, their nutritional contribution to households could be of considerable importance.

2.2.2. Peri-urban milk production system

Peri-urban system is largely found in the highlands where mixed-crop livestock-farming is practiced as well as within urban centers. Economic factors have been dominant in determining the locations of exotic dairy-cattle in these urban and peri-urban areas since the milk-production of exotic cattle far exceeds that of indigenous stock. The animals used in this system are capable of producing 1,120 to 2,005 liters over a 209 day-lactation. Cross-bred and grade animals are used in this production system. The dairy farms in this system rely mainly on purchased feed. They are commercially oriented and will respond to improved technical, input supply and marketing services (Getenet, 2009).

This production system is now expanding in the highlands among mixed crop–livestock farmers, such as those found in Selale and Holeta, and serves as the major milk supplier to the urban market .This system is located around major cities and towns. It comprises of small sized to medium dairy farms which are also capable of keeping improved and local dairy stock. Cattle are housed in improved shelters made of locally available materials. The Type of housing and facilities in the barn in urban and peri-urban dairy farms are, such that it prevents animals from hot conditions theft and rain (Bekele *et al.*, 2015). The farmers have small size of grazing land; they use semi-grazing systems and also practice under stall feeding conditions for improved animals (Yitaye *et al.*, 2009).

The peri-urban dairy is characterized as a semi-intensive crop–livestock farming system. Farmers keep crossbred cows indoors with supplementary concentrate feeding. All farmers own farming land hence the roughage such as crop residues are domestically produced. As compared to the rural dairy system, peri-urban dairy systems are mostly located along roads within reasonable distance to urban centers and involved in fluid milk market (Nigatu *et al.*, 2012).

All small-holder in the urban areas and the mixed small scale dairy production systems are labor oriented, where milking is done by hand, and often done twice a day. Production on most smallholder farms relies heavily on family labor. The milk production levels also vary between different dairy breeds (Zewdu, 2004; Adebabay, 2009).

2.2.3. Urban production system

Urban dairy production system is market oriented like most urban dairying of Ethiopia and other East African countries, is characterized by market orientation. The types of feed commonly used in this production system include purchased concentrates and roughages of conventional and non-conventional sources atela. In addition to these, different fruits, wastes and road side grazing were also used. (Asrat *et al.*, 2016).

As farmers have limited access to farming or grazing land, they are often based exclusively on livestock under stall feeding conditions (Yitaye *et al.*, 2009).The main feed resources are agro-industrial by-products and purchased roughage. The primary objective of milk production is generating additional cash income (Belete *et al.* 2010). This production system serves as the main milk supplier to the urban market (Ahmed *et al.*, 2004; Yitaye *et al.*, 2009). Milk is either sold to dairy cooperatives, on the local informal market or directly to consumers from the farmer's gates (Azage *et al.*, 2013).

2.3. Traditional milking practice in Ethiopia

The majority of rural house hold milking of cows done twice per day morning and evening. The dams suckled by the calves for a few minutes before milking and allowed for some times

to stay with dam there after (Alganesh, 2002) the cows are milked in the shade graying field in front of the home stage none of which clean environment for milking (FAO, 2010).

Hand milking is performed by massaging and pulling down on the teats of the cow. Milking animals are kept with the rest of stock in the shade or enclosure during the night. Milking is done in the shade of grain feed in front of the homestead or under a tree, however, as this area are not kept clean except for dung removal milking cows usually become solid with dung urine and other (Yalganesh, 2002). Good hand milking practice increase milk yield in dairy farm. These are milking environment milking must be carried out in shade or roofed milking place which is clean and dry (Mulugeta *et al*., 2013).

2.4. Traditional milk and milk products handling and processing practices in Ethiopia

Milk and milk products play an important role in human nutrition throughout the world. Milk is also highly perishable and can easily be adulterated whilst the quality of the milk is highly dependent on farm management. Strict and comprehensive dairy regulations are therefore customary and necessary (Banda, 2010), the safety of dairy products with respect to foodborne diseases is a great concern around the world. This is especially true in developing countries where production of milk and various dairy products take place under rather unsanitary conditions and poor production practices (Zelalem *et al.,* 2006). Equipment used for milking, processing and storage determine the quality of milk and milk products. The use of plastic and traditional containers can be a potential source for the contamination of milk by bacteria, because this allows the multiplication of bacteria on milk to contact surfaces during the interval between milking (Abebe *et al.,* 2012).

Traditional milk processing in Ethiopia based on ergo (fermented milk), without any additional culture, and this practices in the country is basically limited to smallholder level and hygienic qualities of products are generally poor (Zelalem *et al.,* 2006). According to Sintayehu *et al,* (2008), during urban dairy production only 54.5% of house hold after their consumption, surplus milk had been churned the rest household did not churned and also some are always churned. In mixed production system 66% household churn all the milk and 37.3%

did it intermittently, some others did not churn at all. 58 % operated churning to get butter and butter milk for household consumption, while 14% had no infrastructure to access market and the rest were restricted by cultural taboos not to sell whole milk but only to churn it.

Butter produced from whole milk is estimated to have 65 % fat and is the most widely consumed milk product in Ethiopia. Of the total milk produced, 40 % is allocated for butter while only 9% is reserved for cheese. Traditional butter, which ferments slowly at room temperature, can be kept for a year or longer, offering rural consumers a readily storable and durable dairy product. Mostly 96.5 % dairy producers used traditional churning material, which are made from clay pot, keil' (Ahmed, 2003).

In most part of the countries milking container are normally made from woven grasses, calabash, hollowed wood, skin, clay pot, in which disinfection is difficult and rinsed with cold water, smoked by burning chip of clean African or acacia busia (FAO, 2010). In most case the practice for limiting spoilage of milk in Ethiopia are limited to certain treatment that include immediate boiling of milk after its production and sanitizing methods, which include smoking of the vessels used to processing or storage of milk and milk product. This practice of smoking of vessel by burning wood chips of specific tree and shrubs has an advantage of milk
Milk processing is usually designed to remove water from milk or reduce the moisture content of the product. Generally milk processing is not well developed in Ethiopia (Azage *et al.,* 2007). In Ethiopia, butter milk is converted in to local cheese which is reserved for home consumption and considered as a staple food by many smallholders (FAO, 2010).

2.4.1. *Yogurt* (Ethiopian naturally fermented milk)

Yogurt is one of the most common traditionally made fermented milk product in Ethiopia. As indicated by Desalegn (2013), it is made by natural fermentation of milk under ambient temperature, without the addition of starter cultures using traditional utensils under non hygienic environment. *Yogurt* is the most natural milk preservation originated from the in ability of livestock owner to control the keeping quality of the milk (Behnke, 2012). In Ethiopia, *yoghurt* makes the base of further processing of milk in to more stable fermented

milk products .The relatively low pH of *Yoghurt*, ranging from 4.3 to 4.5 retards the growth of pathogens and spoilage bacteria enabling its further storage (Zelalem *et al.,* 2006).

2.4.2 .Traditional butter *(kibe)*

Butter is made by churning *Ergo* (sour milk) which has been collected over a few days. When sufficient amount of milk (4-5 liters) is collected, it is transferred to a churn made of gourd clay pot. The gourd churn used in the area is hanged on a tripod and swung to and fro. When using clay pot, the churn is placed on a mat on the floor and rocked back and forth until butter grains are formed (Eyyasu *et al.,* 2014).

Since butter is always made from fermented milk there is no tradition of using cream. These traditional sold of butter by women are common in every community of the country (Yonad, 2009). In traditional butter making milk is collected over period of 3-4 days in clay pot or other materials. The churn is then stopped with a plug, pieces of skin or leather or other similar materials stretched over the opening and securely tied. Then after the churn is vigorously agitated or churned in such a way that air is incorporated in the liquid (Eyassu *et al.,* 2014).

Although different materials can serve as a churn for butter making, clay pot and bottle gourd are the most commonly used (Yonad, 2009).The break point that is the point when butter starts to form, can be detected by a change in the sound of the milk up on agitation. After butter granules have coalsed in to large grains, the churn is rotated on its base. This collect the grain in the center and forms lumps for butter, the butter is then skimmed off. Kneaded in cold water and washed to re move visible residual butter milk (FAO, 2005).

The performance of the clay pot churn was compared with those of a locally made and an imported wooden churn. The locally made churn is static, cylindrical, has a hand-operated revolving beater and a capacity of 30 liters. The imported wooden churn is also cylindrical but is fitted with fixed beaters and is rotated by hand. Its capacity is 31 liters. The traditional earthen ware churn has a capacity of 24 liters, the churning action is achieved by rocking the churn back and forth (Anonymous, 2003).

2.4.3. *Arera* (Defatted Butter)

Defatted butter milk is a semi-liquid product that remains after butter making. *Arera* is a local name for defatted butter milk in Ethiopia. It has a thin consistency and basically contains the casein protein of milk .Its test and odors are similar to those of yoghurt. It is either consumed in that form or cooked to produce cheese. The consumption of defatted butter milk depends on the standard of living of the family. In contrast to other traditional dairy product *Arera* comprises 91.5% moisture, 3.1% protein, 1.4% fat, 3.4% carbohydrate and 0.6% ash. A hundred gram of *Arera* gives 95 milligram calcium, 84 milligram phosphorus, 1 milligram iron 0.03 milligram of thiamine, 0.21 milligram riboflavin and 0.10 milligram niacin (*Hearse et al.*, 2007).

2.4.4. Ayib (Ethiopian traditional cottage cheese)

Ayib (Ethiopian traditional cottage cheese) is a white, soft curd type of cheese in which it is produced in many regions of the country. It is made from butter milk obtained after churning of sour whole milk (Tesfaye, 2007). For the production of this traditional Ethiopian cottage cheese called ayib, butter milk is heated in a low fire to about 50 ^{0}c (Ocnnor, 2003).When the curd and whey separate, the heating is stopped and an whey separate, the heating is stopped and the contain of the pot are allowed to cool, straw is introduce into the milk pot to serve a sieve .The whey is drained off and the cheese curd is kept in a clean bowl or pot. From the total milk produce 9% is allocated for cheese making (FAO, 2005).

Table1: Total Cheese production (Metric Tonnes) in different African countries

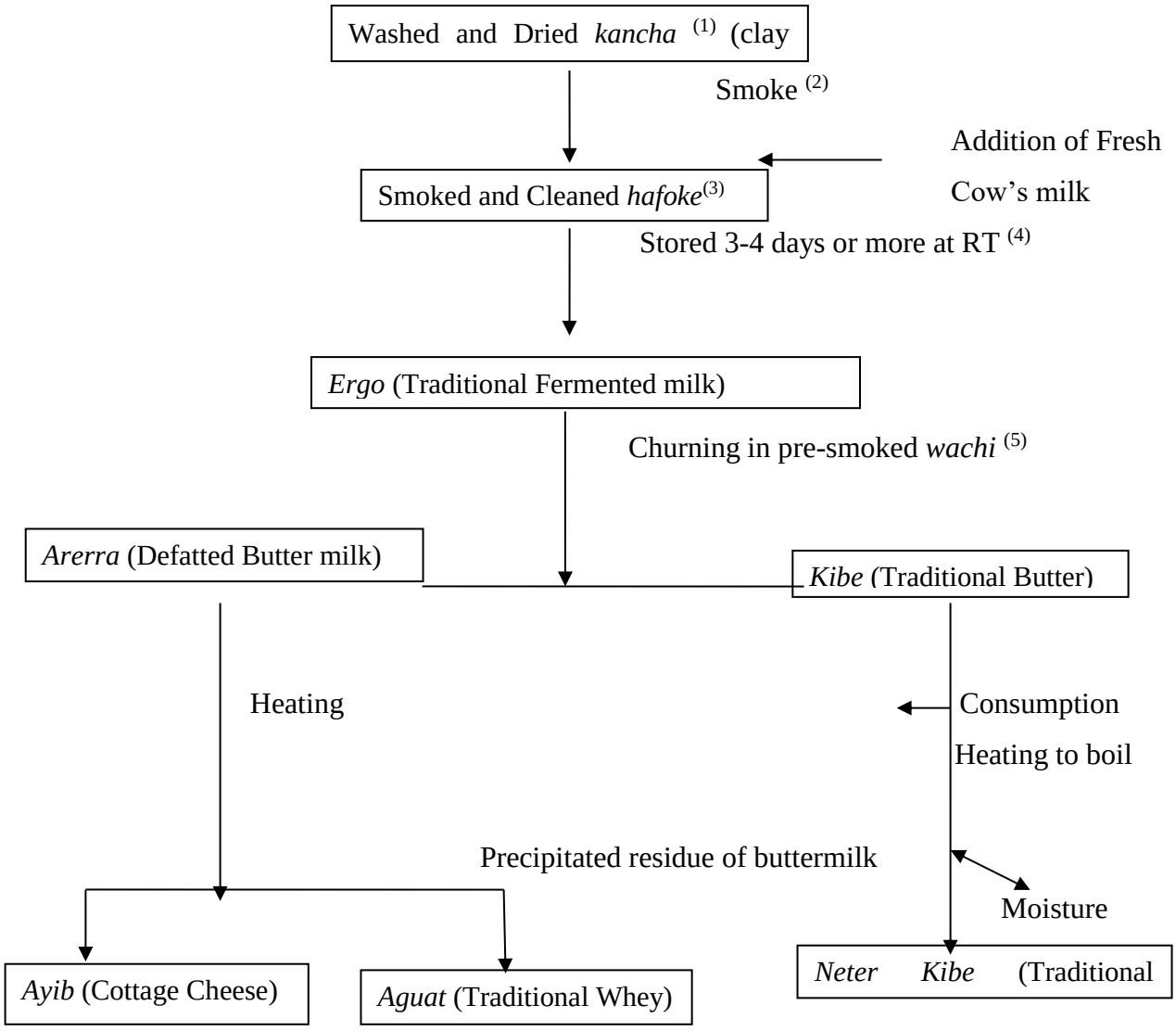
Country	Production 1994	Production 2003
Algeria	1045	2000
Angola	1007	1007
Botswana	1498	5000
Egypt	333950	498000
Eretria	216	Na
Kenya	210	Na
Mauritania	2664	2000
Morocco	6947	8000
Namibia	70	Na
Niger	12064	1500
Nigeria	7022	8ooo
South Africa	38000	38000
Sudan	72479	152000
Tanzania	1200	3000
Ethiopia	**4600**	**6000**

Source: FAO (2003)

Na: not available

2.4.5. Whey *(Aguat)*

Aguat/ whey is the liquid that remains after most of the fat and protein in the milk are removed during cheese making (Ocnnor, 2003). Whey should be fed to animals; calves, cows and dogs or consumed by humans. Whey contains valuable nutrients, 0.6 to 0.65 whey proteins, 0.5 to 0.7 minerals and about 0.75% protein (Azage *et al.,* 2013). The whey from cheese making vary according to the type of cheese made and, therefore, the content of protein, salts and lactose also vary. Whey proteins extracted from whey by ultra-filtration have also found many uses in the food industry (Ocnnor, 2003).



Source: FAO 2004

Figure1. Flow scheme for processing of various traditional fermented milk products.

N.B (1) *Kussa* is a traditional storage utensil made up of calabash, clay pot or hollowed wood. (2) Smoking is done using burned stems of selected plants. (3) Cleaning is done using plant fiber materials commonly known as *foxso*. (4) RT – room temperature (5) *Wesso* is a traditional utensil, which may be either a calabash, larger clay pot, hollowed wood or animal skin for the purpose of churning.

2.5. Additives in milk that gives flavors

Flavored milk is milk that has sugar, coloring and mostly (inexpensive artificial) flavorings added to make it more appetizing, especially to children (prominent example can be found in the artificial strawberry flavor and glaciate (can be sold as powder) to beaded to plain milk or bought pre-mixed alongside other milk product (Hunduma, 2011).

Savory flavors are showing up in yogurt and cottage cheese .dairy processed should be taking not consumers showing interesting savory flavors. When peoples think of yogurt they usually associated with sweet flavors. The most popular flavors remain the standards are strawberry, blubbery, chocolate, salt and banana. But the worlds of yogurt flavor innovation are become quite diverse as consumers interesting unique flavor combination continuous to grow .and now savory flavors are on consumer's radar. While the majority of eliding yogurt flavors are sweet the spread of savory offerings at food device and retail may portend. Salt is added to butter to decrease the perishability (Hammoud, 2012).

Chocolate milk is sweetened coca-flavored milk .it can be created by mixing chocolate syrup (chocolate powder) with milk from cow. it can be purchased pre-mixed with or made at home by blending milk with cocoa powder and a sweetener such as, sugar or sugar substitutes, melted chocolate, chocolate syrup or powdered chocolate mix milk (Hunduma, 2011).

2.6. Challenges and Constraints of Dairy Production in Ethiopia

The main challenge of milk production is poor genetic potential of the indigenous cattle with production as low as 0.5 -2 liters/day/cow. Weak linkages between research and extension are factors that have hindered dairy development. Inadequate extension and training service, market constraints, limited availability of credit facilities, and unavailability of land are major production constraints (Zelalem *et al.*, 2011). Livestock producers encounter various livestock management problems, prevalence of major endemic diseases, poor feeding and high stocking rate on grazing lands (Land O'Lakes, 2010).

Based on Aleme and Lemma (2015), constraints that hinder livestock development can be broadly categorized into environmental, technical, infrastructural, institutional and policy making. Based on the report, the major technical constraints are under nutrition and malnutrition, high prevalence of diseases, poor genetic resource management and poor market infrastructure

3. MATERIAL AND METHODS

3.1. Description of the Study Area

The study was conducted in Cheha Woreda, located in Gurage Zone of Southern Nations, Nationalities and Peoples Regional State (SNNPRS), Ethiopia, which is located at 185 km southern of Addis Ababa and 27 km Southern west of Wolkite town. Emdiber town is capital of Cheha district. The district is bordered by Enemor Ener Woreda in the south, Oromiya Region in the west, Ezha Woreda in the east, Gumer and Geta in the southeast, and Wabe River, which separates it from Abeshege, and Kebena in the north. The Woreda is classified in to dega, wona- degas, and kola Agro-climatic Zones. The geographical location of the study area extends from 8° 00'18.9" to 8° 15' 28.53" N and 37° 35' 46.48" to 38° 03' 59.59" E at an elevation ranging from 900 to 2812 meters above sea level (M.a.s.l). The Woreda constitutes

40 rural kebeles (the lowest administrative unit) of which 39 are rural and 1 is urban town.

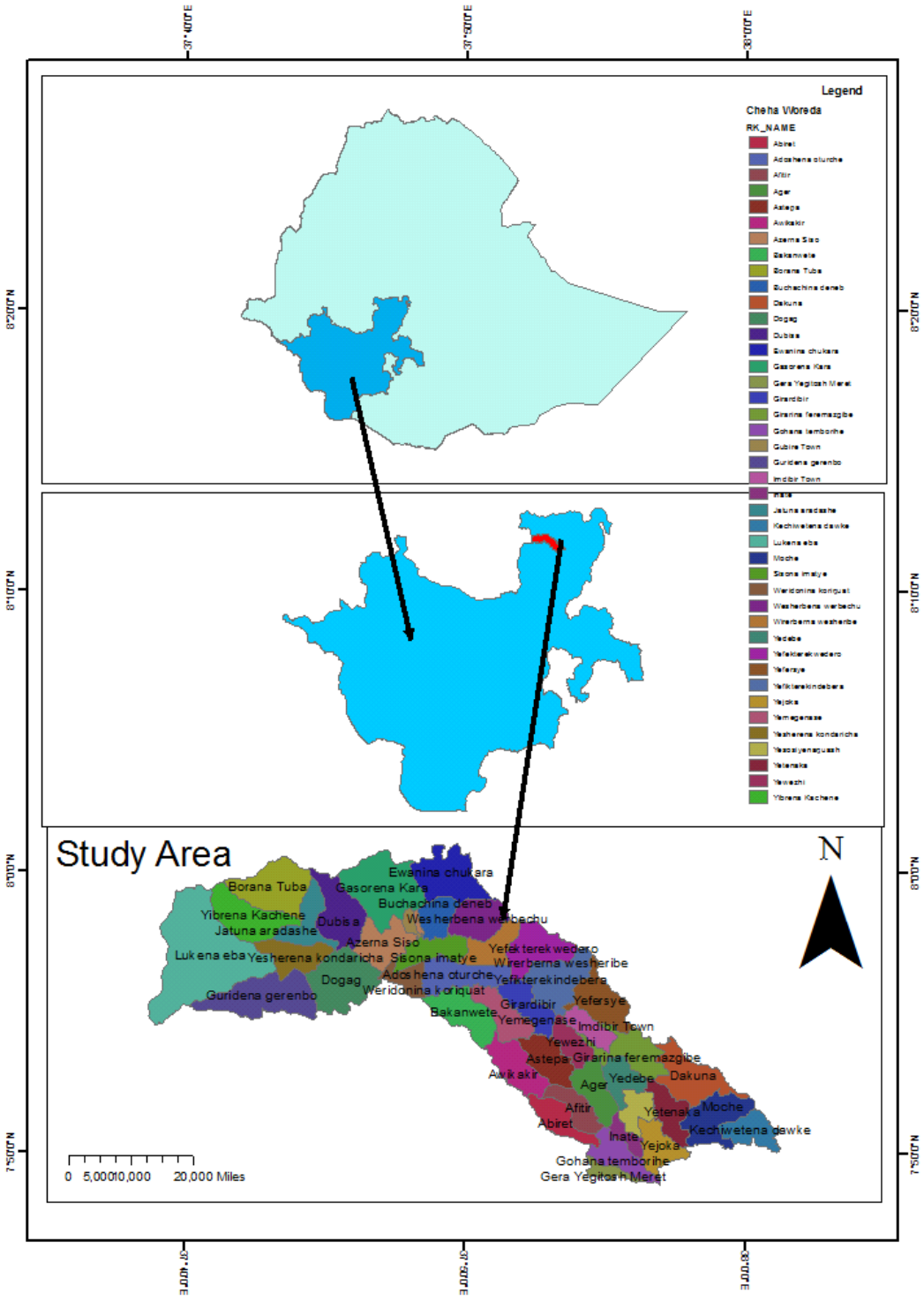


Figure 2.Map of the study area.

3.2. Sources and Method of Data Collection

Both primary data like milk production system, traditional milk and milk product handling practice, traditional milk processing methods, marketing system of milk and milk product consumption of milk and milk product, constraints of handling and processing of milk and milk products etc. and secondary data such as livestock population, demographic structure, altitude, rainfall, topography, temperature etc. could be used for the study. The primary data was collected through personal observation and key informants using semi-structured interview, open and close ended questionnaires. The secondary data was collected from annual reports of agricultural development office, and reviewing different written documents.

3.3. Sampling Method and Sample Size

Both purposive sampling techniques were used. Purposive sampling technique was used to select representative kebele Sisoaimatye, Werbechu, Azerna while purposive sampling techniques was used for house hold selection.

From the total of 40 kebeles in the wereda 3 representative kebeles was selected purposively. The sample size for the study comprised of a total of 60HHs (20HHs from each of the three selected rural kebeles). The house hold for the present study was selected using random sampling techniques.

3.4. Method of Data Analysis

Simple method of data analysis was used, i.e. Most of data analyzed with SPSS version 20 or statistical analysis software. Percentage, average and mean. The result was presented in the form of tables and figures.

4. RESULTS AND DISCUSSION

4.1. General Characteristics of the Households

This study showed that 16.7% of the respondents were male and 83.3% were female and the majority of were above 36-45 years old, 53.3% and followed by 46 years old and 18-35 years old, 30% and 16%, respectively (Table 2).

Table 2: Back ground information of respondent

Demographic attribution		No of respondents	Percentage
Age	<18 years 18-35 years 36-45 years >46 years	- 10 32 18	- 16.7% 53.3% 30%
	Total	60	100%
Sex	Female	50	83.3%
	Male	10	16.7%
	Total	60	100%
Marital status	Married	54	90%
	Single	6	10%
	Total	60	100%
Level of education	Illiterate Primary Secondary Collage/university	51 9 - -	85% 15% - -
	Total	60	100%

The result of the study reveal that, largest portion of respondents is with the age range of 36-45years and there were no respondent below 18 years. Table 2 shows that were the largest portions of respondent are within productive age group and positive effect in the performance of house hold in milk processing in the area.

The study showed that, from the total respondents 16.7% were males and 83.3% were females. Table 2 shows that were, the largest portion of respondents are females and smallest portion of respondents are males. We concluded that milk producer and processer in the study area, the

largest part is female. The marital status of majority respondent were married (90%) and unmarried (10%) this shows that dairy production and product processing more applied by married.

The study also revealed that from the total respondents, 85% were illiterate, the remaining (15%) were able to Primary. About 15% of the respondent's were educated which were less than the report by Yusuf (2003) who indicated 24% of respondents in Harar milk shed who had higher education. The reason for these different may be the finding of Yusuf (2003) may be takes large numbers of the respondents from urban area but in our finding or in our study most of our respondent was from rural area. So it is obvious that peoples that live in urban area are mostly educated and people that live in rural area are illiterate. According to our observation and survey, when the educational level of the respondents increase or higher educated they use small amount 2.5 liters of mean milk use for processing these indicated that educational level becomes high increase the traditional handling, and processing of dairy products become gradually decrease. Because the educated societies give great attention for modern or technical handling, and processing milk and milk products rather than traditional handling and processing of milk.

Education is an important entry point for empowerment of communities and an instrument to sustainable development. In this context, educational level of the farming households may have significant importance in identifying and determining the type of development and extension service approaches. The role of education is obvious in affecting household income, adopting technologies, demography, health, and as a whole the socio-economic status of the family as well (Adebabay, 2009).

4.2. Productive performances of cattle

According to the survey result found from 60 households with total number of cattle of 309 out of which 172 are cow; whereas 93 of them (cattle) are calves and 44 are number of bulls. The mean of total dairy cow per household was 2.8667, 1.5500 for calves, and 0.7333 for bulls respectively. As indicated in Table 3 the total number of dairy cows is greater than the total number of calves. The daily milk production from 60 house hold was 79 liter/day.

Table 3: Total number of cattle per house hold and their productive performances

Value	**Cattle holding size**			
	Number of cows	**Number of calves**	**Number of bulls/HH**	**Raw milk production/day**
Mean	2.8667	1.5500	0.7333	1.32
STD	1.39572	.64899	0.57833	0.469
Minimum	1.00	1.00	0.00	1
Maximum	6.00	4.00	2.00	2

*STD; standard deviation

4.3. Consumption of Milk Products

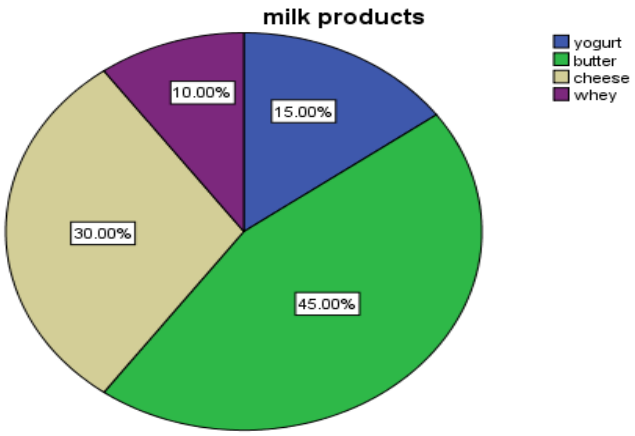


Figure 3 Milk products in the kebeles

According to the response of the respondent and observation consumption of raw milk in the study area is not usual yogurt practice rather in most cases the small amount of milk produced daily is accumulated over a few days to manufacture the butter and others that fetches a better price (Figure3). Almost all (100%) of the farmer has been processed in to different products about yogurt (15%), Cheese (30%), Butter (45%), whey (10%) of milk products are respectively produced or processed in the study area. Our result was in agreement with the

finding of Ayantu (2006) in which consumption of raw milk in the Wolayta zone is not a usual practice rather in most cases the small amount of milk produced daily is accumulated over a few days to manufacture the butter that fetches a better price.

4.4. Milk Processing and Materials

According to the respondent traditional milk processing in the study area was by keeping for yogurt, shaking milk before churning to make butter, and heating of butter milk for cheese and whey production. Churning of milk is done by first rotating the clay pot in which the milk shake followed by collecting of fat droplets those which are suspended on the butter milk (Figure5).There are different equipment that are used for milking and milk processing, such as clay pot (for storage, fermentation, cheese making, and churning of milk) and plastic (Table 5)

Table 4. Materials used for milk processing.

No	Parameter		Percent used by HH
1	Equipment	Clay pot	100
		Plastic	0
		Gourd	0
2	Packing	Enset plant leaves	95
		‘festal’	5

The use of clay pot for storage of various dairy products and its use for churning were observed in the current study area. This observation was in agreement with the previous report

of Bahir Dar zuria and Mecha district (Asaminew, 2014). Various plant leaves including 'Enset leaves' are used as the most common butter packing material.

According to some respondents these leaves may reduce the volume of the butter because the butter remains on leaves when the leaves are removed. As a result they want to use cleaned 'festal' believing that butter doesn't stick to this 'festal' (Table 5). Based on milking materials some these respondents used plastic materials. Findings are similar to those of studies conducted in Southern Ethiopia (Abebe *et al.*, 2013). The majority of the women practice limited sanitary practice before milking. Calves are allowed to suckle a little milk prior to milking to enhance milking.

4.5. Additive for milk and milk products

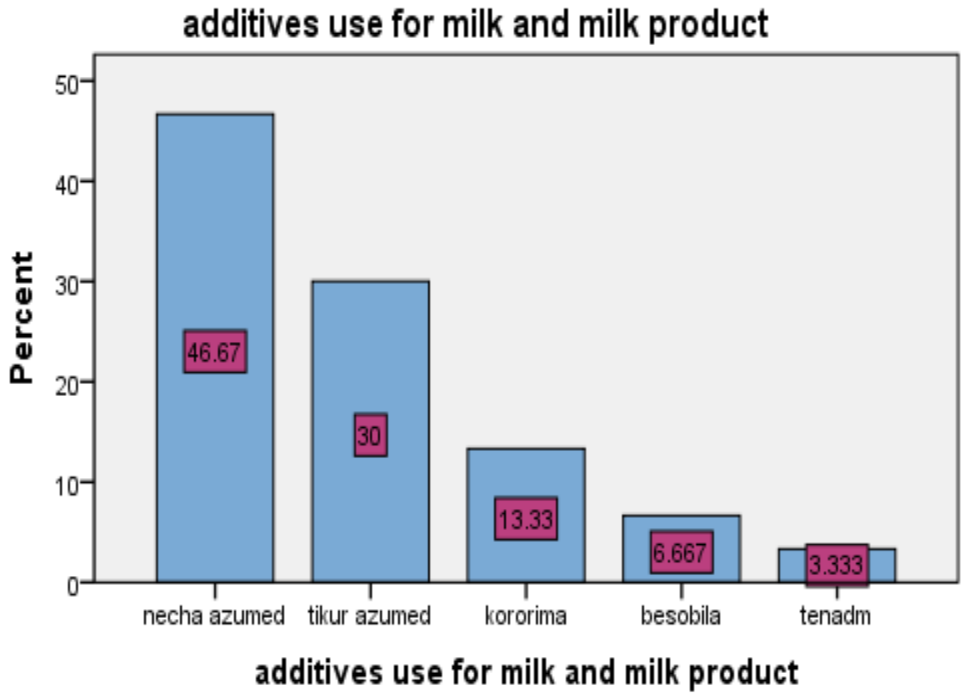


Figure 4. Additive use for milk and milk product.

As indicated in Figure 4 the respondents used various traditional milk additives used for milk and milk product. There are different additive used for milk processing such as; Nech Azumed, (46.67%) Tikur Azumed, (30%) Kororima, (13.3%) Besobila

(6.667%) and Tenadam (3.333%). The additive used in the study area was little due to the people preference. In general, the processing steps, according to the respondents responses first the sour milk was stirred for some time using a stick with three fingers by inserting the end in the sour milk and then agitated by rocking the sour milk then the clay pot back and forth until milk fat is recovered in the form of butter. While churning, when butter starts to from the sound of the milk being shaken will change. The churn is then rotated on its base. The butter grains will from lumps of butter in the middle, which are skimmed off. The butter is then kneads in cold water and washed. The remaining butter milk is heated for further processing to make cheese (ayib) or consumed as it is by family members (Figure 5). Small holder milk processing is based on sour milk as reported from different part of the country (Alganesh, 2002). The current process of cheese were similar with report of FAO, (2010). Butter milk is converted in to local cheese which is reserved for home consumption and considered as a staple food by many smallholders in Ethiopia.

In the study area each household accumulates milk either from a single milking animal 172 are cow animals and then it was processed in to different products such as; butter, cheese, whey and concentrated fermented milk which is supported similar with report of Zelalem et al., (2006). Most of traditional methods of milk processing are slow and insufficient and they give low yield of butter per unit of sour milk and require high labors in put (Zegeye, 2003). Which is similar with the current study; therefore, some respondents said that milk processing is labor intensive.

Fermented milk is the main form of preservation performed in the study area. This is agreed with a study reported from Holeta by Alganesh (2002). In which most of the milk products produced are highly perishable and are meant for consumption within a few days. However, the product is mainly used for marketing, in orders to prolong shelf life of milk and to increase consumer preference milk and milk products the milks should be processed in to different products in the study area. In addition, the milking, and storage and processing containers were fumigated with plants like *hafoke* and *wachi*.

Most of the respondents use hafoke for smoking which is not different to earlier reports in Ethiopia; smoking milk containers using different parts of various plant species were very important (Yitaye, 2009). The amount of milk used for processing was different between respondents. Generally milk processing in to different milk products in the study areas summarized below in (Figure5)**.** In Ethiopia, butter milk is converted in to local cheese which is reserved for home consumption and considered as a staple food by many smallholders (FAO, 2010). The research conducted in the study area also agree with this idea. Butter milk is either consumes directly by the household by adding pepper or converted in to local cheese.

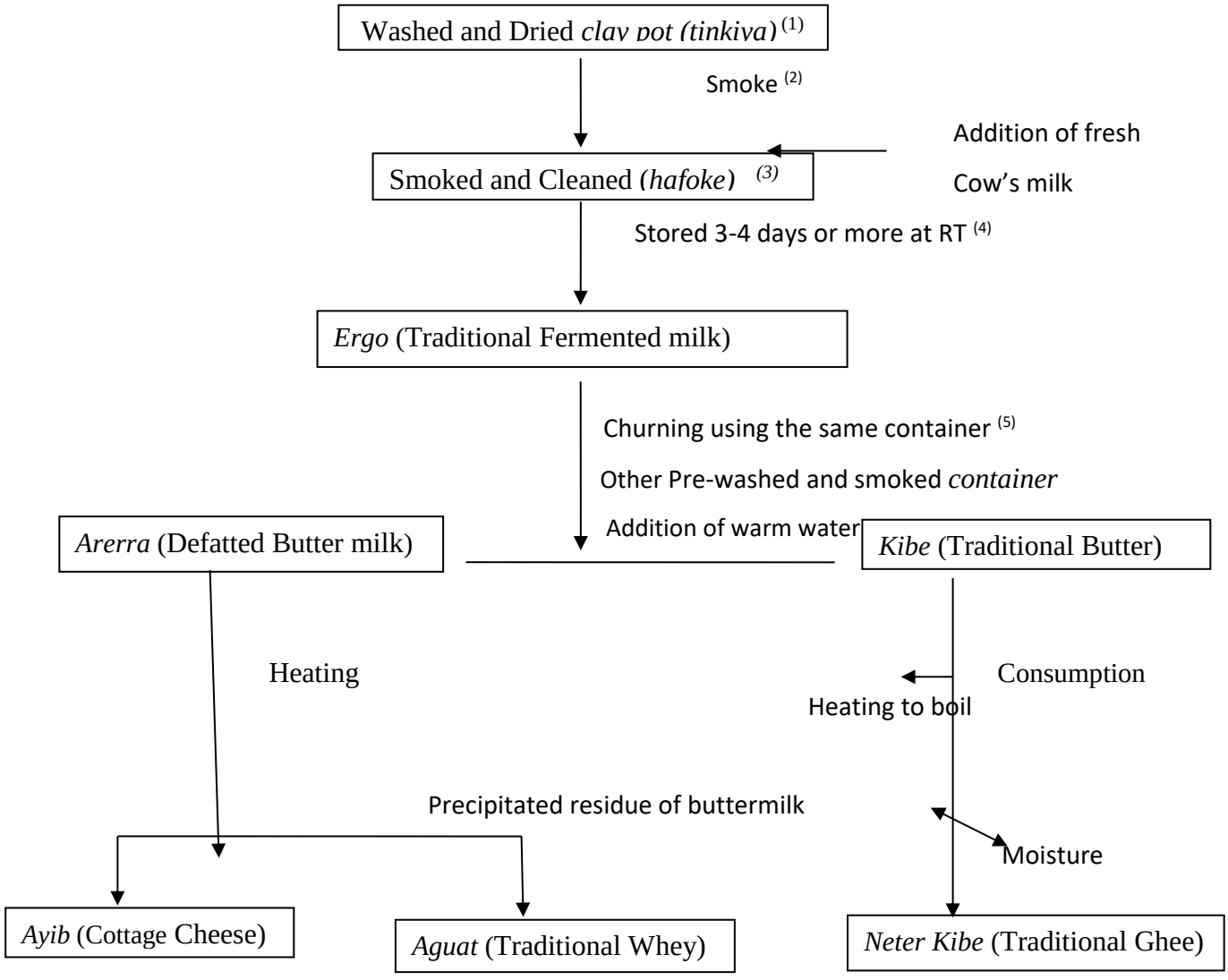


Figure 5.Depicts the process and milk and milk products in the study ares.

Table 5 shows that the milk processing and amount of milk in litter per one churn. The person who process and not process milk for different products, (71.7%, 28.3%), respectively. The amount of milk used for processing in to different products was varied from place to place in the study area because of the amount of milk and the ability of clay pot to hold milk during processing.

Table 5: Milk processing, and amount of milk use per churner at a time.

Characteristics	Kebele			Total	
	Sisoaimatye	Werbechu	Azerna		
	N=20	N=20	N=20	N=60	%
Number of respondent who process milk	15	17	15	47	71.7
Number of respondent who do not process milk	5	3	5	13	28.3
Amount of milk in litter per one churn					
≤2.5	11	9	8	28	48.6
3-4	6	8	7	21	35
≤5	3	3	5	11	18.3

N=number of respondents

5. CONCLUSION AND RECOMMENDATION

The quality of the milk in the study area during the survey period handling practices was not in compliance with the recommended milk handling. The majority of the respondents were traditionally process milk in to different products like butter, cottage cheese and butter milk in order to increase the shelf life of milk and milk products. Dairy production in the study area is basically limited to small holder level with poor hygienic qualities of products. The feeding system of the area is totally out door, based on communal grazing land.

Above all they do not use clean water to clean udder and other milk utensil. Problems for dairy product processing is vary from one kebele to another kebele. Most of traditional methods of milk processing are slow and insufficient and they give low yield of butter per unit of sour milk and it requires high labors input.

Therefore, based on the above findings the following points are recommended

Provision of training to the farming communities is imperative so as to improve their knowledge and skill on the management of dairy animals, and production of quality milk. Establishing milk collecting and processing unit through encouraging the dairy producers. In general it is recommended if the people use modern or technical handling and processing of milk and milk products rather than traditional handling and processing.

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7. APPENDIX

TRADITIONAL MILK PRODUCTION AND PROCESSING PRACTICE IN CHEHA WOREDA.

1. Description of study area.

Appendix 1. Questionnaires for Household Respondents

Household socio-economic characteristics

1. Name of respondent_____ Zone_____ Woreda_____

Kebeles _____ Age _____Sex_____ Male_____ Female

2. Educational level.

A. Primary B. Secondary C. Collage/University D. Illiteracy

3 Marital status: A) Married B). Single C) Divorced D) Widowed

4 Family sizes? A. Male _____ B. Female _____C. Total_____

Number of cows …… Number of calves …….

Daily production per cow per liter …… Numbers of bulls……...

Annual milk products per cow

A. Ergo…. B. Butter….. C. Cheese…… D. Whey…….E others if any…….

Milk processing.

1. How can process your milk?
2. List the importance of milk processed?
3. What are the milk products of your milk? A. Yogurt B. Cheese C. Butter D .Ghee
4. How many litters of milk use for processed in to different products?

A.3-4litters……B.5-6litters…….. ….C.7-8litters…… D. others

5. Did you use any additives for your milk and milk product? A. Yes B. No

5. What are the additives use for different milk and milk product?

NO	Milk and milk product	Types of additive uses
1	Raw milk	
2	Cheese	
3	Butter	
4	Whey	
5	Ergo	
6	others If any	

6. What type of material used for churning? A. Clay pot B. Gourd C. Other material

7. Do you smoking the churning material? A. Yes B. No

8. If you yes, what is the purpose of smoking?

9 If you smoke what type of plant you use?