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**FACULTY OF ELECTRICAL AND ELECTRONICS TECHNOLOGY
AND INFORMATION AND COMMUNICATION TECHNOLOGY**

**(DEPARTMENT OF ELECTRICAL AND ELECTRONICS
TECHNOLOGY)**

Assessment of Milk Quality and Quantity around Bule Hora Town

Planning : Case of Bule Hora Town and Around its Area

MSc Thesis for the Partial Fulfillment of
Master of Science in Electrical Automation and Control Technology
Management

By,

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Assessment of Milk Quality and Quantity around Bule Hora Town

A Thesis submitted to

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(DEPARTMENT OF ELECTRICAL AND ELECTRONICS
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TECHNOLOGY MANAGEMENT**

By,

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DECLARATION

I, the undersigned, verify that the thesis is completely my own original work and complies to all internationally accepted standards; I have correctly acknowledged and credited all sources used in its preparation.

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FACULTY OF ELECTRICAL AND ELECTRONICS TECHNOLOGY AND
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Thesis on

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ABSTRACT

Quality is one of the for measurements of one thing or process, we must follow the standards or procedures to identify the quality of any measurement. Milk quality depends on worldwide quality standards. The technique must be standardized internationally. So that in this paper, the quality and quantity of milk are identified depending on the standard and the production level of the milk source. In the selected area (BuleHora), milk production is processed or produced throughout the year. The produced milk is used for household consumption, and there it is used for selling to gain income from production. In the process of production and selling, there are gaps in terms of quality; for that matter, these paper or research is trying to show how the quality and quantity of milk is identified during implementation and also trying to reduce the spoilage level of milk around the production area to consumers in the stud area. The production of milk is worked in urban and rural areas. When we are talking about the urban area, it's classified into two parts urban and per urban. Farmers and others who use milk production have problems determining the quality of the milk in all parts of the research zone due to a shortage of testing equipment. To ensure the quality and quantity of milk, it's important to check the kind and amount of adult ration. PH, ultrasonic, and temperature sensors are used. The testing process is needed to identify adult ration levels in the milk and decide the milk is best for consumption, and the producers get a reasonable price. This thesis shows how to measure milk fantastic and amount the use of a pH sensor to decide the pH value, an ultrasonic sensor to calculate the quantity, and an LCD to show the measuring result.

Keywords: Liquid crystal display (LCD), PH sensor, Ultrasonic sensor, milk quality and quantity, international standards, Temperature sensor.

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LIST OF ABBREVIATIONS

PH	Power of hydrogen
LCD	Liquid crystal display
LED	Light emitting diode
DC	Direct current
USB	Universal Serial Bus
PC	Personal computer
AC	Alternative current
I/P	Input power
O/P	Output power
CRT	Cathode ray tube
Vcc	Positive line
DL	Double Layer
TL	Triple layer
Cit	Counter on triple layer
IDE	Integrated Development Environment
GND	Ground line
AC	Alternating Current

1 CHAPTER ONE

INTRODUCTION

1.1 Background

The nutrition is resulted by the effects of lack of treatment or adulteration on milk production and ways of quality controlling process. This kinds of effects indicate that to response (reaction) change or dissimilarity due to controlling the quality standards, to develop in qualified way of production and consumption process. The study should be planned to answering (address) specific problem or questions. The experiment is organized by scientific method and also executed and designed to that assessment of the consequential data sufficiently touching the problem and question in reasonable way, the majority of dairy results shows coefficient of dissimilarity from 8to25%. Normal milk from dairy cows includes 87% water, 3.8% fat, 3.4% protein, 4.5% sugar (in the form of lactose), and 1.3% minerals, according to Gill (7). Milk includes slough-depth elial cells and white blood cells. High-quality milk should be white, odorless, and devoid of pesticides, extra water, antibiotics, and antiseptics. No color is allowed. In selected area (Bule Hora) the production of milk is processed or produced throughout the year. However, the produced milk is used for house hold consumption and the rest is used of reselling to gain income from production. In the process of production and selling there are gaps in terms of quality, for that matter these paper or research is trying to show how quality and quantity of milk is identified during implementation and also trying to reduce the spoilage level of milk around the production area to consumers in the study area. The produced milk is transported from point of production to Users and Town mainly through Transport. Such milk is near to affected by organisms which reduce Milk quality and also Milk is perishable item so during adulteration (different mixtures),lack of quality controlling and also during summer months, it is likely to be spoiled during transportation.

Due to this reason :-This thesis presents research work which is carried out to implement assessments of milk quality around Bule Hora Town and its rural area and presents to design quality detection system according to process control system with the combination of microcontroller system.

1.2 Statement of Problem

According to the statement/data of Oromia Region West Guji Zone, animal development office assumptions 100,000 liters of milk collected per day in Bule Hora. Out of this liters around 6000 liters spoiled by different organisms and also to test the quality they are using Organoleptic test (smell, test by tongue, texture.....), there is no device or machine to measure the quality and quantity of

milk production. This means them working by assumption only.

To improve such problem this thesis proposes the assessments of milk quality and quantity around BuleHora town and Method to improve measuring system by using Arduino designed device or indicator.

1.3 The Research Objective

1.3.1 General Objective

Determine the quality and amount of Bule Hora's milk.

1.3.2 Specific Objective

- To Use pH sensors to determine the quality of Bule Hora's milk.
- To determine the Temperature of milk around Bule Hora town by using Temperature sensor
- To determine the quantity of milk around Bule Hora town by using Ultrasonic sensors. Prototyping Arduino based quality and quantity indicating device or machine.
- To determine measurement technique, calibration and quantification.

1.4 Research questions

The query is addressed?

1. What elements and players affect milk quality in the research area?
2. Which areas of Bule Hora Town Produce Quality Milks?
3. How many liters of milks are collected around BuleHora per year?
4. In assumption how many liters of milk are spoiled or affected by different organisms?
5. To identifying the quality of milks, what types of device or machine that can use around the tow?

1.5 Significance of the study

Valuable information was generated on milk, the research assist BuleHora Town and its surrounding area. For better intervention animal development office was participated through the identification of research gap. To implement the best way to change the livelihood of producers and consumers. The output of these research is very important to develop quality checker system to strength both stakeholder, producers and consumers. At a stage of sample collection the way of sample collection is take in to account according to the standards.

1.6 Scope of the study

To obtain relevant data and information on milk and associated problems in the study region, the research covers just a fifth of the area and goes only as deep as necessary. Research must be done to determine the milk quality and develop the system's milk quality checker. This thesis' results aren't limited to simulations. The probe involves rail movement.

1.8 Thesis Organization

This part is one of point of the thesis. The five below are chapter outlines.

Chapter1: is about introduction to the thesis. This chapter introduces the thesis overview, including its objective, problem statement, significance, and scope.

Chapter2: is an article review. This chapter provides review about background of milk quality checker system.

Chapter3: Include the Methodology. This will explain about how the thesis was organized and the flow of the process in completing this thesis.

Chapter4: This chapter consists of programing and discussion of results

Chapter5: This chapter consists of conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, some of the related literature evaluations of first-rate checker overall performance are discussed. The milk producers is based totally on high and dependable first-rate of products. However, to meet the necessities put by using shoppers it is imperative to arrange first-rate of all exercise of the area. This first-class have to be checked at the conclusion of the production technique and in every Quality Management System.

2.1 Source of Data

The research used secondary and primary data sources to capture concrete conclusions. Respondents are the main source of data. Main sources were important informants and consumers. Analyzing public and unpublished documents yielded secondary sources. This helped produce primary data.

2.2 Literature Survey

Recent research and surveys have published a rising need to consistently collect, monitor, analyze, summarize, and visualize relevant information from huge amount of data. Using a cryoscopy water adulteration in milk can be carried out to detect. That stated by Lucasde Souza. To the NIR range great affectability which is how s quick reaction by The Ga as Sb sensors, reflected light diffusely utilized to distinguish? The checker tried on milk tests corrupted with water. High coefficient of assurance and outcomes displayed, higher than 0.99. for identification of milk degradation the created frame work may be utilized in this approach (1). Then earns of strep to coccus sagalactiae that identifies attractive countered develop (a group Bstreptococc) in basic mil, stated by Carla Margarida Duarte (2). Basic milk crossing without traveling over the micro fluidic channel in this device, testing for bacterial contamination to determine if it's appealing to include. Wesley Beccaria used electrical impedance to identify milk adulteration (3). Bovine milk was used. Algorithm that allows adulterated and qualify quantitatively the sample of pure milk. Ak-nearest neighbors-classified results

Assessments of lactation and a classification of a hydrous milkfat, altered form of classified butterfat, these another frame work displayed by Pallavi Gupta (4). At least 20% of the creature's muscle is margined for monetary and categorical considerations. Computerized photo meter, micro controlled, which utilizes three LED with displayed in the NIR, versatile gadget and operated without focal point utilization and also filter or moving part, demonstrate the output traction model and resembles a business cryoscopy, quicker related content. These model proposed by Davide. Toginh of elkhound Vanerl Belot\s (5).

2.3 Data Collection Types of Source of Data

This study included primary and secondary qualitative and quantitative data. Primary statistics were acquired from a household survey, dairy cows (from urban/peri urban and rural milk producer residential holdings), and key informant interviews. The woreda office of agriculture, office of marketing, rural job potential introduction office, gender workplace, and other relevant institutions provided secondary sources. Relevant facts were previously found in study reports, books, web sites, government documents, and journalistic sources. Interviews with key informants and family questionnaires were utilized to obtain data for the first phase of the study (an evaluation of milk production and ways to improve it), whereas area measurements were employed for the monitoring component.

2.4 Key informant interview

In the past, an interview with a key informant was conducted to get information from experts on the issue. Herders, processors, ingredient suppliers, and transportation providers were also interviewed.

2.4.1 Household survey

A selected set of respondents received the survey to collect critical information. After testing, questionnaires were adjusted. A preliminary test improved the questionnaires' readability, consistency, and validity. Using questionnaires, the following information was gathered: -livestock species, type and variety by physiological stage, age, and sex; feed resources; milk and milking practices; nearby milk breed productiveness and live inventory disorder incidences of the study area; handling, processing, consumption, advertising, and marketing of milk and milk products; dairy cattle housing; manure managements; type of dairy extension carrier they arrange.

2.4.2 Milk management

Milk or food product borne disorder with admire to security or lack of satisfactory is a great challenge around the world. Poor manufacturing and unsanitary circumstance take place under developing us of which is production of milk and milk product take place (6). Advice used shape liking, storage impact of the exceptional of milk, and processing. Due to use of plastic and traditional containers takes place excessive infection of milk by microorganism as workable source. This is due to the fact of excessive accumulation of bacteria on milk at some stage in contact with interval between milking (1).

2.5 Dairy Cattle Husbandry Practices

2.5.1 Feeding Practice

Except for forage legumes and concerned forage, the research concentrated on total ruminant feed (7). Most urban and metropolitan farms lack land and are near to cities and towns. Peri urban and city farms are

motivated by city inhabitants' increased need for milk [24]. Most dairy farms in the region employ agricultural residues, hay, improved fodder, agro-industrial wastes, and non-conventional feed stuffs. Hay is the region's main livestock feed. Hay's composition and nutrient content derive from agro-ecological conditions. These components included cereal crop residues including barely, wheat, Teff straw, peals straw (legume, peas, lentil), maize, and sorghum. Animals eat stubble. City farms are mostly enterprises that utilize dairy cow supplements. Once upon a time, cows in peril and urban cows were given a drink supplement (8).

2.5.2 Housing

For dairy animal the types of housing is assorted relies upon upon their classes, production system, physiological stage and agroecology (9). In both location the company of housing is one of a kind depends up on the economic stage of the own. Some of them builds in standard tiers and others build via wooden and mud. Good tendencies of housing is offers comfortable location for the animals, ensures better environmental manipulate and decreases of feed stuff and additionally encourage of or proper cleaning environment and adjustments of gear to ensure amenities are reachable to control the cows effectively [5]. Peri-urban zones, especially agricultural fields, receive some urban manure, although only to a limited extent. Manure created as organic fertilizer was regarded economically vital not just to dairy farm owners but also to farmers in adjacent rural regions. Farmers who farmed dairy products in urban and pier-urban regions relied on manure sales (10). Manure utilization in their food and crops is vital. Waste management in dairy production is a major activity. This is the proper cleaning of dairy urines and manure to ensure a sanitary and functional environment.

2.5.3 Watering and Water source

the essential things for the quality milk production is a good supply of clean water and also for the cleaning purpose the same types of water must be used (11).One of the major problems related to milk quality is unsafe water. However producer should apply it be of reusing filtration heat treatment (12).

2.5.3 Disease

Poor people affect milk and other manufacturing in numerous ways. Mortality, lower body weight, early delivery, decreased fertility, decreased labor capability, and decreased milk output affect animal production efficiency (13).

2.6 Physical Properties of Milk

2.6.1 PH value

Using a PH price indicator, milk's acidity may be determined. Milk is pH-neutral to slightly acidic. The cost of a sample depends on when the cow produced the milk, how it was processed, and how long it's been opened or packaged. Because milk includes buffering agents, mixing it with other substances can lower pH. A cow's milk pH ranges from 6.4 to 6.8. Fresh milk pH ranges from 6.5 to 6.7. Milk's pH fluctuates. Bad milk has a lower pH and becomes more acidic. Milk bacteria convert lactose into lactic acid. Evaporated milk is more acidic than whole or skim (14).

2.6.2 Microbial Load and Sources of Raw Milk

At one of a kind imperative points milk may additionally increment and may additionally contaminate in microbial loads. From farmer to the patron long advertising and marketing level, via terrible hygienic practice raw milk can leads to contaminate on and due to operator hygiene and soiled breast (15).

2.6.3 Current Real-World Applications of Milk Spoilage Prevention

A recent trouble push towards innovation in regards to spoilage prevention. These efforts do not do away with the need for future lookup into milk spoilage detection methods, but could serve as substitute options to the problems previously discussed in this paper. Detailed beneath are some examples of these latest innovations.

2.6.4 Starch detection test

Starch is sometimes added to milk. a person who do not understand the cause or end effect add starch to milk to artificially enhance its SNF content (16) and (17).

2.6.5 Urea detection test

Milk supplied by dodgy dealers is tainted with urea, which can cause digestive and kidney disorders and even cancer. Raw milk is "decorated" with urea to provide the impression of more protein. Common adulteration procedure. Milk will be diluted with water, and urea will be added to increase SNF%. A little amount of urea is added to pure milk to extend its shelf life. Section 18 of the Indian Milk Act prohibits adding urea from outside sources to milk (19).

2.6.6 Method of Detection of Melamine in Milk and Milk Products

Melamine is a toxic thiazine compound used to add protein to milk and milk-related products. Milk adulteration can cause renal failure and death (20).

2.7 Summary of Literature Review

After researching the relevant literature, it was found that numerous strategies have been used in the past to increase output by using milk quality indicators to limit noise and interruption. According to this report, Oromia Region west Guji Zone farmers' main source of income is milk. Bule Hora's milk quality indicator and its components aren't well-defined. This study characterized the quality indicator and its constituents. This thesis aims to define the milk quality indicator by constructing a computer-based quality indicator/checker. The findings will be utilized to assess if the recommended system is more effective than previous methods.

CHAPTER 3

METHODOLOGY

3.1 Steps of methodology for the developments of the process

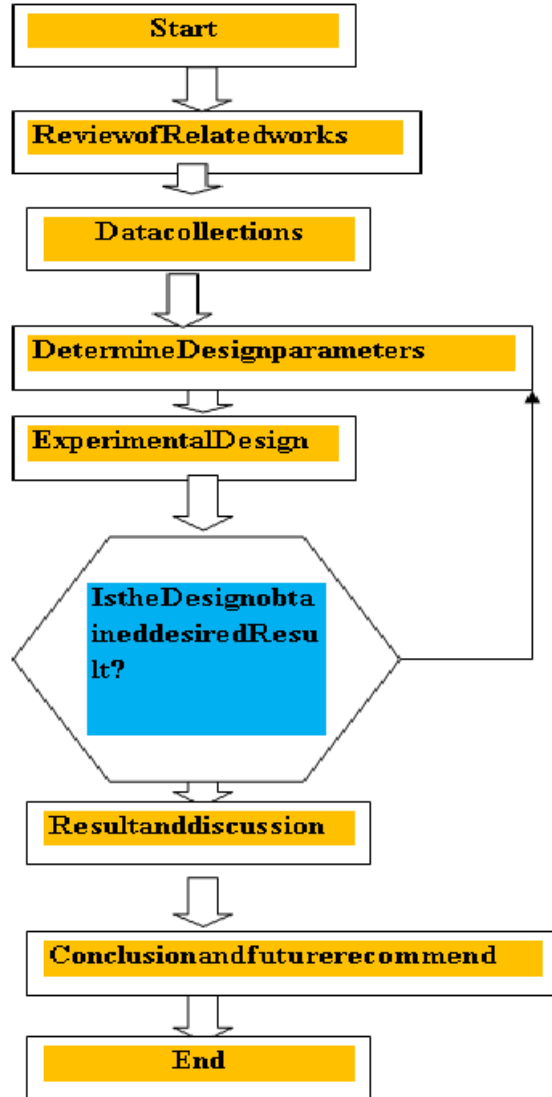


Figure 3. 1 Steps for the developments of the process

3.2 Study area

This investigation was conducted in Bule Hora, west Guji, Oromia, Southern Ethiopia. Ethiopia's capital, Addis Ababa, is 467 kilometers from Bule Hora. It's 1300 to 2600 meters above sea level and at 8016 north latitude and 2808 east longitude. The district has 43 rural Keeble's and 5 urban Keeble's, 31 of which are under "Woynadega" agro ecologies, 5 under "Dega" agro ecologies, and 12 under "Kola" There are two rainy seasons: Arfasa in March-May and Ganna in September-November. During Arfasa, little grains are grown. According to BHFEDO (2019), an unpublished source, the district's typical temperature is 15 to 300 degrees Celsius and annual rainfall is 800 to 1500 millimeters.

The five areas were chosen or selected. In five areas there are 32 milk collection centers, because they had established milk production. According to the collection or production center spread area were as follows; Suro-7, Dugda Dawa-3, Gerba-10, Suruba-7 and Melka Soda-5. Based on ease of accessibility milk collection centers were selected conveniently and also farmers who supplied milk to the centers. The process is most of the time milk adulteration is detected using various chemical tests complicated, difficult, time consuming, and lack of availability of chemical, costly and also there is a lack of knowledge to use the chemical for testing process. No need of introduction about nutrition value of milk to human health and also there are traditional impact on the society or producer. Many vendors use water for adulterating milk. In order to increase the quality of the milk adulteration process must be reduced, when we apply the adulteration on milk the actual quality of milk is decreased or not fulfilled the quality standard. The most common adulterant is water it decreases quality of milk and nutritional value. When we talking about adulteration it's not only regional concern its globally shown in developed country in developing countries due to monitoring and policies are at higher association risk in order to health hazards, milk adulteration can pose. We recommend researching Milk Quality and Quantity. This device monitors many parameters to determine milk quality. This research will assist milk producers and consumers. Farmers would benefit because they could get a fair price for their produce and the system would be harder to manipulate than a physical scale. Customers would benefit from this as a low-cost alternative to pricey and unfriendly meters in other nations. This study may provide a local answer to the problem. This study uses PH, ultrasonic, and temperature sensors to identify milk quality and estimate its quantity. Milk's unique nutritional profile and health benefits make it an important meal. This research estimated milk quality and quantity. Milk analyzers only categorize by amount. This research highlighted these qualities. High-quality milk is valued by quantity, not quality. Milk density may be assessed with an intensity sensor and an ultrasonic sensor.

3.2.1 Arduino ESP32 microcontroller

Arduino ESP32 microcontroller powered by DC 5v. Measurements include PH. Temperature and ultrasonic sensors are also used. Comparing the suggested system to a digital milk analyzer shows that the latter requires more personnel and costs to maintain and repair its mechanical and electronic elements. Because of this, it's hard to tell if damaged sensors have ceased working. In these trials, producers or consumers provide strategies to reduce milk adulteration. The recommended gadget may be used for small and large-scale dairy production and gives quality assurance for farmers and customers. Anyone may utilize it. Milk quality information.

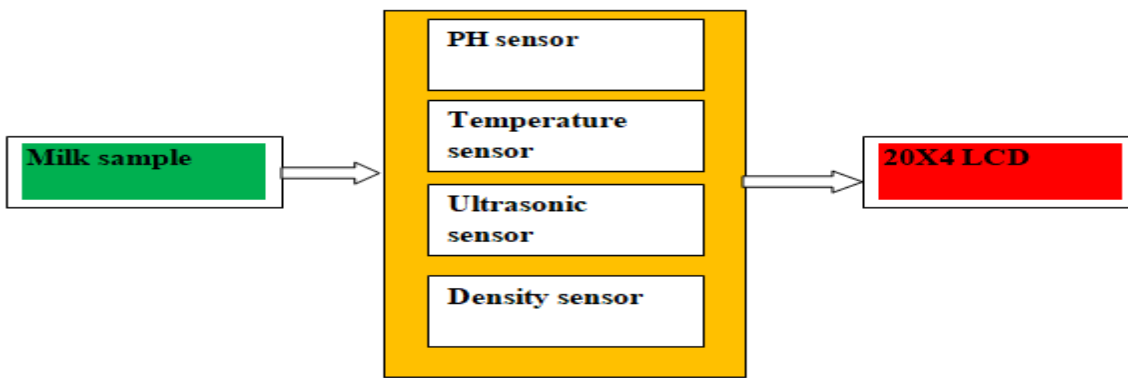


Figure 3. 2 Block Diagram of assessments of milk quality and quantity

3.2.2 Process Design

For a cross-sectional investigation, representative milk samples were collected from milk producers and collecting sites. In addition, surveys were distributed to the same farmers whose milk had been analyzed to discover behaviors that may impact milk quality and to develop farmers' viewpoints on a payment system based on grading and a premium on low-count milk delivered to customers. This was done to investigate methods that impact milk quality and farmers' views on a payment system based on grading and a premium on low-count milk delivered to processors. This was done to get farmers' thoughts on a premium-paying scheme.

3.2.3 Sample size

The sample size was based on ombuietal (1994) total counts and in Bule Hora town coliform counts in milk producers. A study found this. The sample size was determined by Martinielial (1987).

$$n = \frac{Z\alpha 2Pq}{L_2} \quad (1)$$

Where: Z = 1.96, P = fraction of farmer's milk supplies meeting quality norms, and 80% may be assumed for P. q=1-p, and L=0.05 precision. The calculation yielded 50 samples.

3.2.4 The collection of samples

The process is applied individually or in household level, who brought milk to collection center or to consumer. The collected milk were systematically sample by assigning raffle code or ticket and collected the min small size bottle in different composition for quality and quantity identification.

Table 3. 1 No of registered member and sample taken per collection center in Bule Hora and surrounding area

Zone	No of registered member / zone	Collection center sample from	No of sample taken	Materials used
West Guji	50	Gerba	10	Small size bottle
		Suro	10	Small size bottle
		Suruba	10	Small size bottle
		Dugda Dawa	10	Small size bottle
		Malka soda	10	Small size bottle

3.2.5 Sample Tests

Suro, Dugda Dawa, Gerba, Suruba, and Melka Soda were selected based on agro-ecology, accessibility, and dairy production potential and proportionate sampling procedures (from the target population, 10-15% was utilized to produce a representative sample size for both families and consumers). Two-stage sampling was used.

- Stage I: In each location, homes with milking cows were identified, regardless of breed or size.
- Stage II: Randomly chosen milking cow owners were questioned. Sample Testing was used in the Bule Hora Veterinary Laboratories' Departments of Public Health, Pharma Ecology, and Toxicology.

3.2.6 Analysis of Composition

Arduino was used to analyze PH, milk content, and additional water.

3.3 Questionnaire for primary data collection

Which was administered to farmers on a household level to evaluate their milk quality and revenue knowledge.

3.3.1 Respondent Profile

A descriptive analysis evaluates and interprets collected data. It's used to describe the demographic factor. It's important to make broad observations about the answers to broader subjects or demographic inquiries. This study covered and studied gender, age, educational background, position, Wereda, and zone.

Table 3. 2 Statistics for milk collection center level

N	Gender	Age	Qualification	Region Of respondent	Zone	Woreda	Position
Valid	20	20	20	20	20	20	20
Missing	0	0	0	0	0	0	0
Mean	1.2000	2.2000	5.1000	1.0000	1.0500	1.7000	1.6500
Median	1.0000	2.0000	6.0000	1.0000	1.0000	1.0000	1.0000
Mode	1.00	2.00	6.00	1.00	1.00	1.00	1.00
Sum	24.00	44.00	102.00	20.00	21.00	34.00	33.00

Table 3. 3 Gender

Valid	Frequency	Percent	Valid percent	Cumulative percent
Male	15	75.0	75.0	75.0
Female	5	25.0	25.0	100.0
Total	20	100.0	100.0	

3.4 Frequency and Descriptive Table

Table 3. 4 Age

Valid	Frequency	Percent	Valid percent	Cumulative percent
	6	30.0	30.0	30.0
31-40yrs	10	50.0	50.0	80.0
41-59yrs	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Table3. 5 Qualification

Valid	Frequency	Percent	Valid percent	Cumulative percent
write read	1	5.0	5.0	5.0
1-8grade	2	10.0	10.0	15.0
Grade10	3	15.0	15.0	30.0
Gradel2	2	10.0	10.0	40.0
Above diploma	12	60.0	60.0	100.0
Total	20	100.0	100.0	

Table3. 6 Region Of respondent

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Oromia	20	100.0	100.0	100.0

Table3. 7.Zone

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid West Gujii	20	100.0	100.0	100.0

Table3. 8 Wereda

Valid	Frequency	Percent	Valid percent	Cumulative percent
Melk soda	5	25.0	25.0	25.0
Gerba	4	20.0	20.0	45.0
Dugdadaawa	5	25.0	25.0	70.0
Suruba	2	10.0	10.0	80.0
Suro	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Table 3. 9 Position

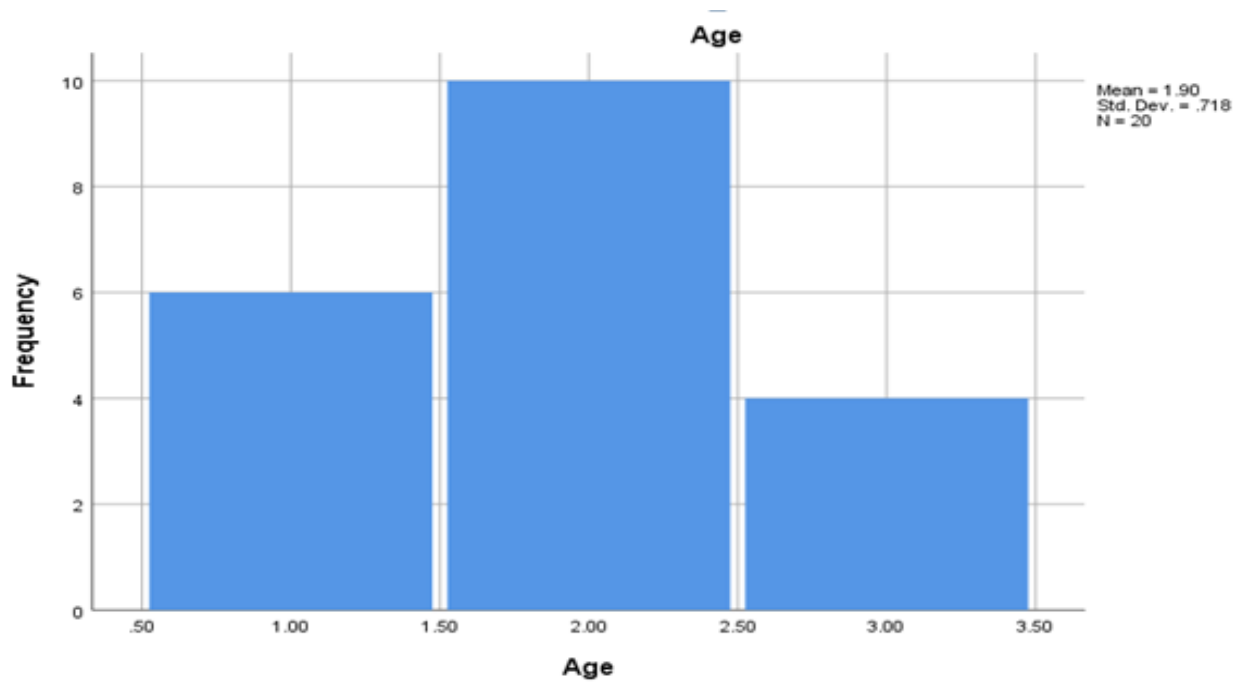
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Owner	13	65.0	65.0	65.0
Employee	2	10.0	10.0	75.0
Customer	4	20.0	20.0	95.0
Producer	1	5.0	5.0	100.0
Total	20	100.0	100	

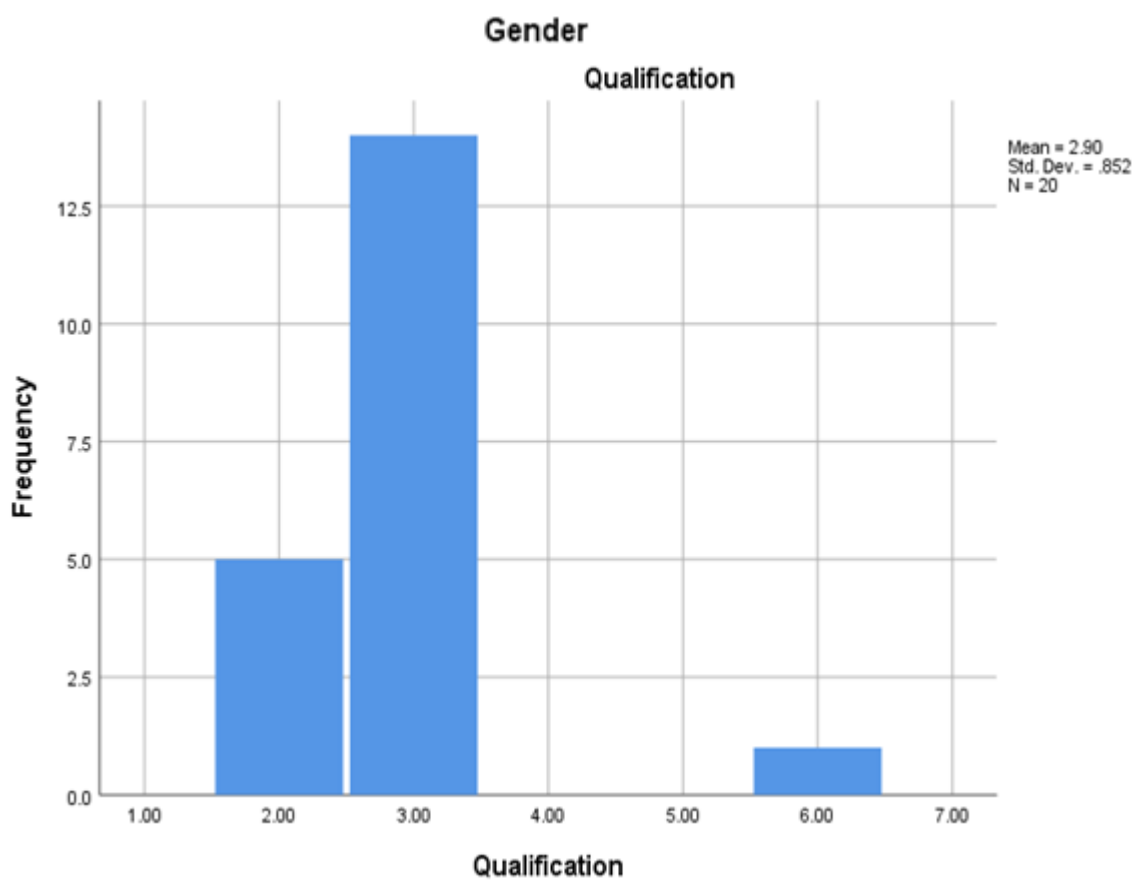
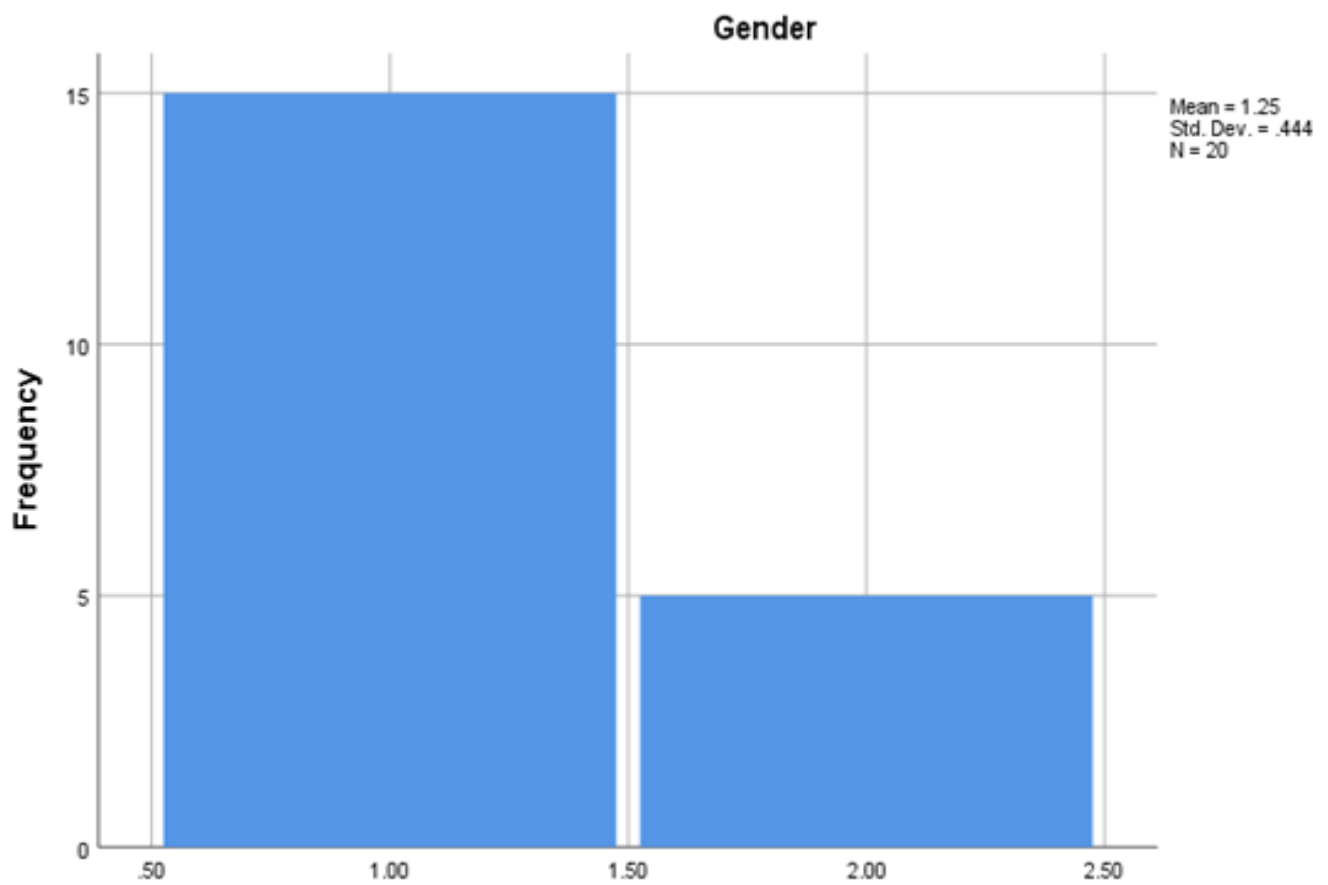
Table 3. 10 Statistics for Household level

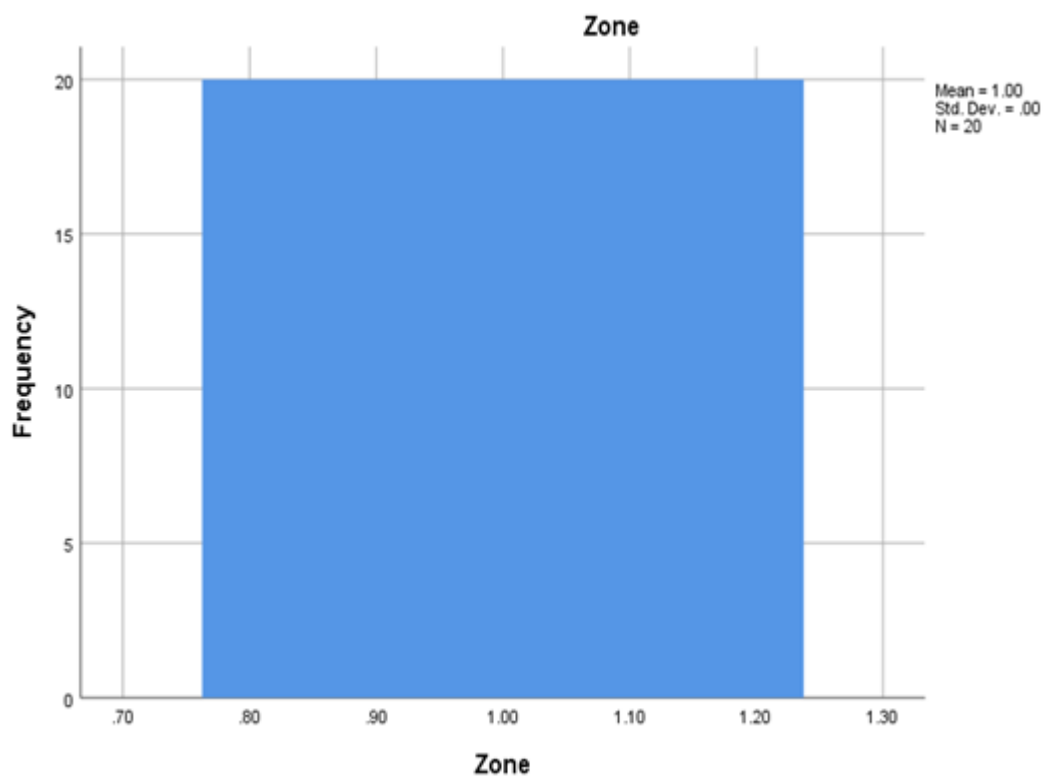
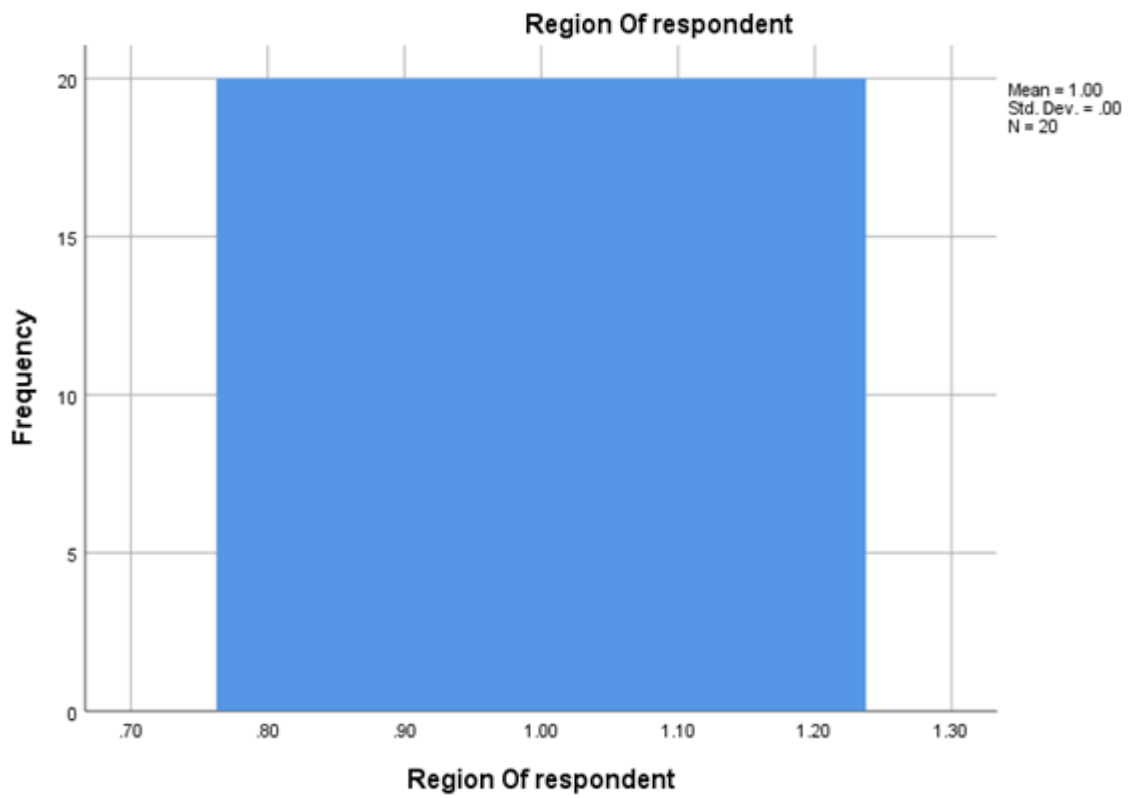
N	Gender	Age	Qualification	Region Of respondent	Zone	Woreda
Valid	20	20	20	20	20	20
	0	0	0	0	0	0
Mean	1.25	1.9	2.90	1.0000	1.0000	3.35000
Median	1.0	2	3.00	1.0000	1.0000	4.00000
Mode	1.0	2	3.00	1.00	1.00	1.000

Table3. 11 Frequency and Descriptive Table

Valid	Frequency	Percent	Valid percent	Cumulative percent
Male	15	75.0	75.0	75.0
Female	5	25.0	25.0	100.0
Total	20	100.0	100.0	







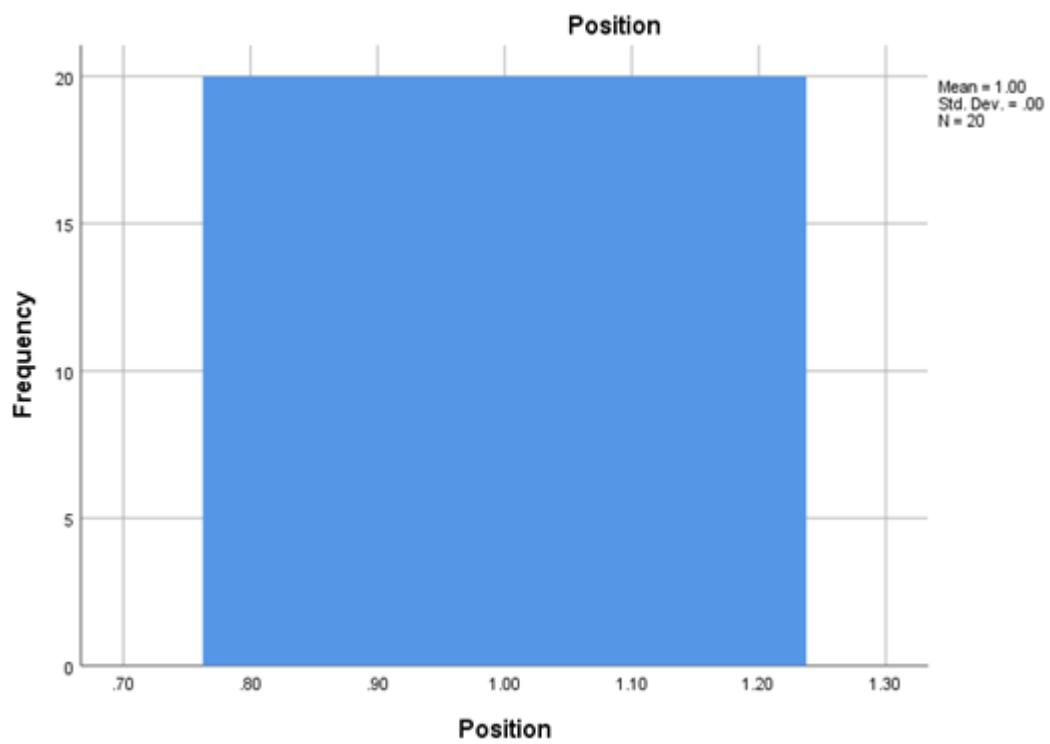
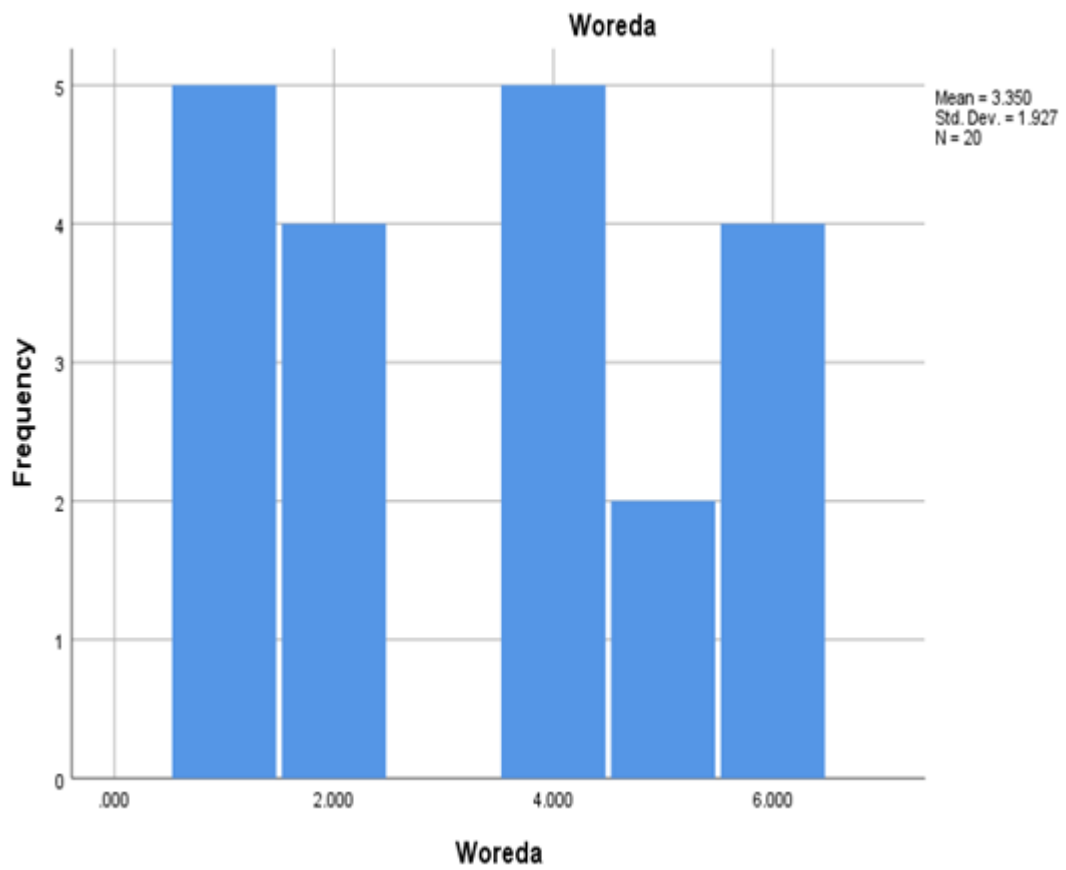


Figure 3. 3 Histogram

Table 3. 12 Age Household

Valid	Frequency	Percent	Valid percent	Cumulative percent
20-30yrs	6	30.0	30.0	30.0
31-40yrs	10	50.0	50.0	80.0
41-59yrs	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Table 3. 13 Qualification Household

Valid	Frequency	Percent	Valid percent	Cumulative percent
write & read	5	25.0	25.0	25.0
1-8grade	14	70.0	70.0	95.0
Above diploma	1	5.0	5.0	100.0
Total	20	100.0	100.0	

Table 3. 14 Region Household

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid West Gujii	20	100.0	100.0	100.0

Table 3. 15 Zone Household

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Oromia	20	100.0	100.0	100.0

Table 3. 16 Wereda Household

Valid	Frequency	Percent	Valid percent	Cumulative percent
BuleHora	5	25.0	25.0	25.0
Gerba	4	20.0	20.0	45.0
Dugdadaawa	5	25.0	25.0	70.0
Suruba	2	10.0	10.0	80.0
Suro	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Table 3. 16 Position Household

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Owner	20	100.0	100.0	100.0

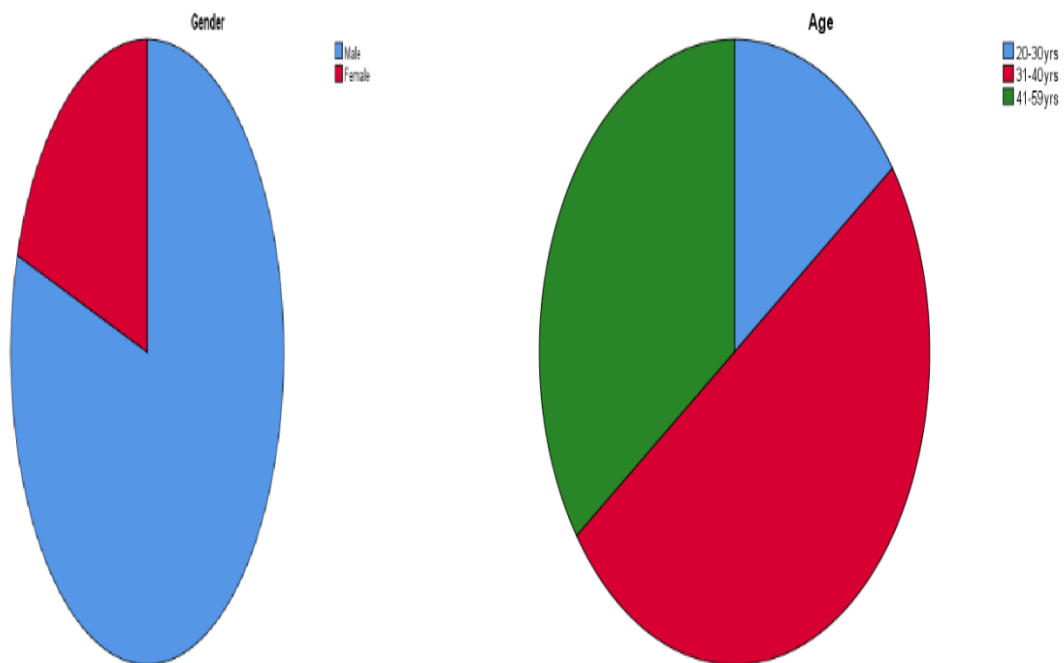


Figure 3. 4 Pie chart

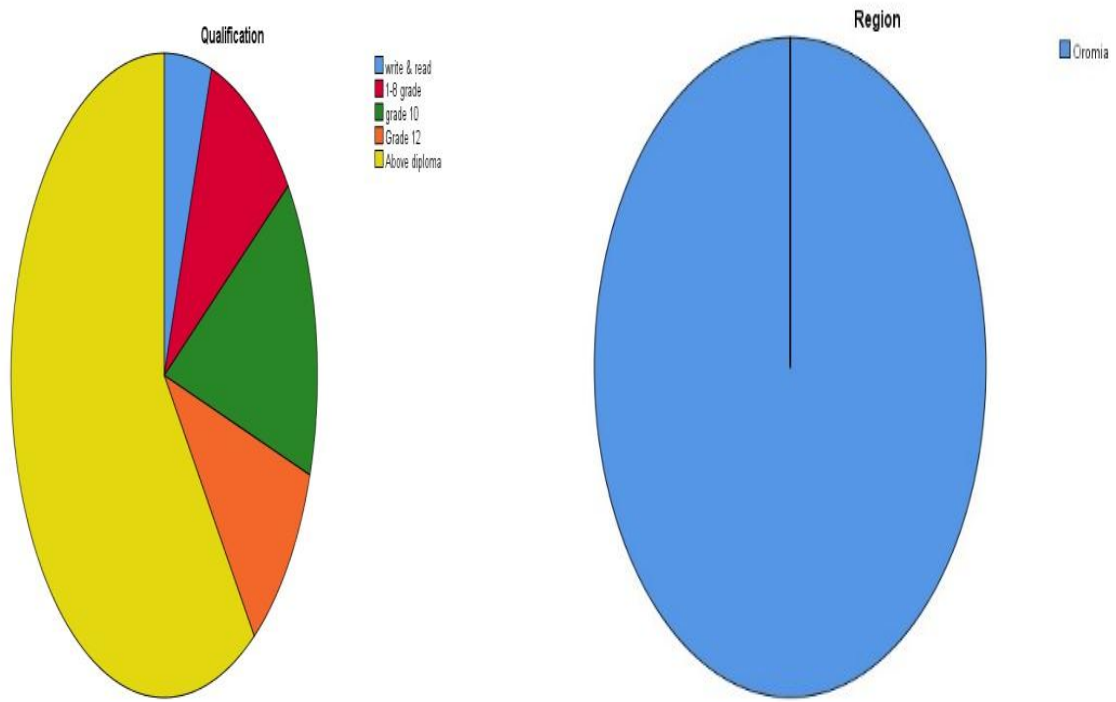


Figure 3. 5 Pie chart

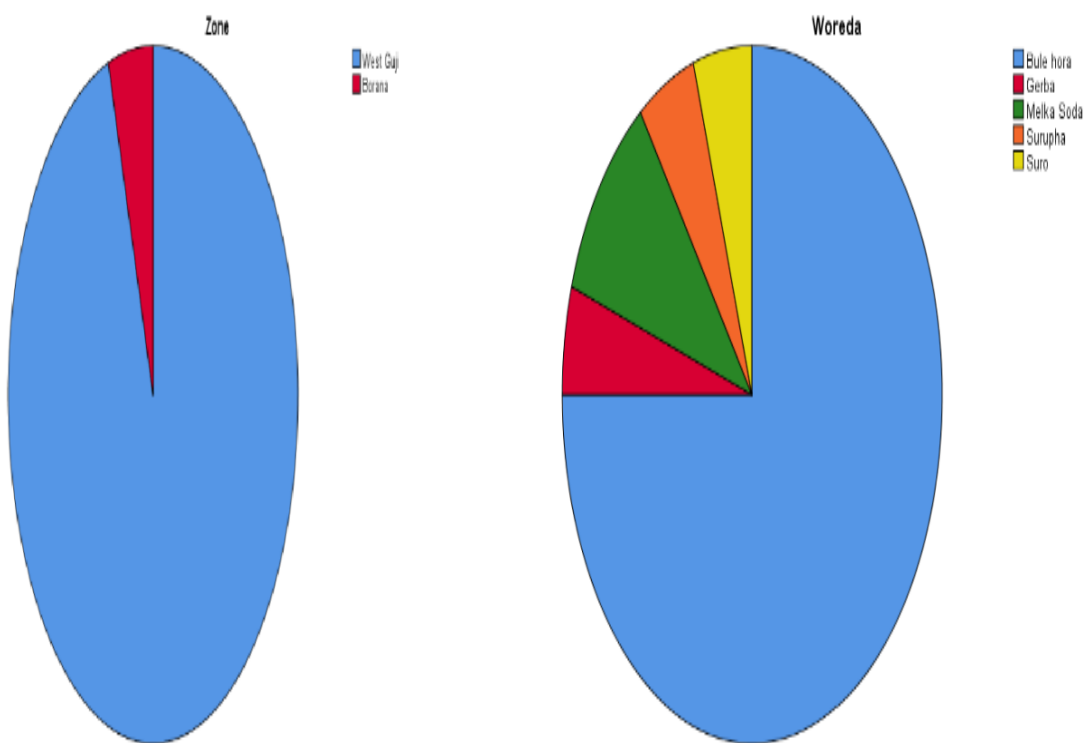


Figure 3. 6 Pie chart

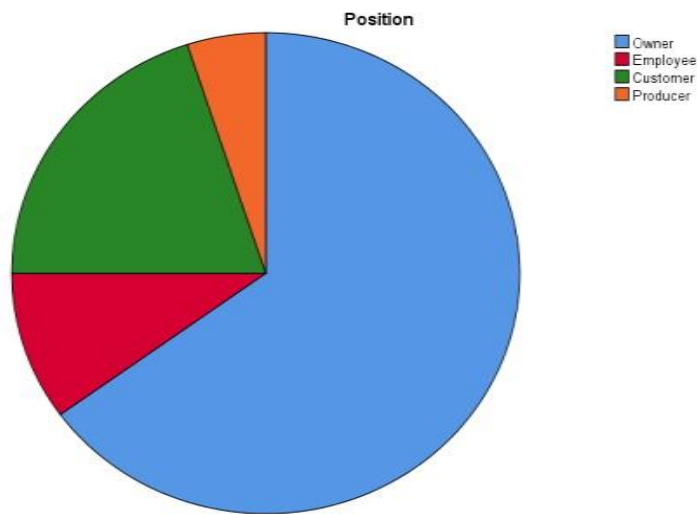


Figure 3. 7 Pie chart

3.5 Production of milk

3.5.1 Advantage and Disadvantage of milks

Advantage: - Cow's milk is highly nutritious and is one of the few foods that can sustain a young one without supplementation. Milk contain essential vitamins and minerals deficiency of which can cause illness in humans.

Disadvantage:-

Milk's rich nutritional content helps bacteria grow. Microbes cause human illness. Some of these make milk unsafe for ingestion. Poor production and manufacturing might generate antibiotic and detergent carryover. The factors which are considered when we are conducting a survey In the region where the study was done, common cattle breeds are used by 98.6% of families, while 1.4% use artificial insemination. Most dairy cow owners (77.8%) chose the best cow from the available stock based on breed (61.7%), physical appearance (38.9%), tail length (27.8%), and family history (79.2%).

3.5.2 Types of feed used around the area

Non-traditional feeds and hay were the region's main animal nutrition supplies.

3.5.2.1 Traditional method for quality and quantity

To test the quality, they are using organoleptic test (smell, test by tongue, texture....),

there is no device or machine to measure the quality and quantity of milk production. This means they are working by assumption only.

3.5.2.2 Impacts on introducing new technology

Due to quality issues, a lack of training, an absence of a formal milk market structure, and an absence of improved forage cultivation practices, the number of livestock that could be produced in the study area was severely limited, despite residents' interest in and potential to adopt dairy technology. Local dairy processors and smaller farmers liked the technology's early presentation (seller). Both groups saw ways to improve milk quality checks. This unpredictability underscores the need for thorough awareness of milk quality's effect and controls to maintain an acceptable level.

3.5.2.3 Measuring parameters of milk quality and quantity

These variables reflect an integrated point and view over all milk quality management practices and previous studies although investigates several milk quality, the occurrence of anti-microbial residues by screening methods.

3.5.3 Method of improving milk quality

A recognized test to ensure milk and milk products fulfill application practices, rules, and standards. The test ensures purity and chemical composition. To manage milk quality, employ established tests, rules, and standards.

3.5.3.1 International standards of milk quality and quantity.

High-quality milk has a normal chemical composition, is free of disease-causing germs and hazardous compounds, is free of sediment and extraneous substances, has a low tetra table acidity level, has a nice flavor, and has adequate acidity to retain its quality.

3.5.3.2 Quality testing methods

The density of milk is used for quality testing to check for the addition of water or the removal of cream. According to O'Connor (1994), water dilutes milk, but cream thickens it.

3.5.3.3 Organoleptic test

Milk's organoleptic properties are tested using sight, smell, and taste to determine its overall quality. Organoleptic tests are performed to determine if a food or pharmaceutical product may transfer its taste or smell to its packaging. Food and pharmaceutical companies employ these testing. Boiling-test coagulation One of the early diagnostics for mastitis in colostrum or milk with a pH below 5.8. When milk has turned into manure, it

contains acids, rennet-producing bacteria, and colostrum's from the cow's birth. Unable-to-withstand-heat milk must be rejected (O'Connor, 1994). Alcohol-screening examines the protein instability caused by repeated acidity and alcohol. According to O'Connor (1994), an appositve test is caused by excessive albumen and salt concentrations (mastitis).

3.5.3.4 Tetra table acidity test

Tetra table acidity measures milk's freshness and bacterial activity. The longer room-temperature milk sits, the longer bacteria have to multiply and convert lactose into lactic acid. This causes milk's acidity and pH to rise. This is actual titratable acidity, according to O'Connor (1994) and Vishweshwar and Krishnaiah (2005).

3.5.3.5 Compositional quality measure of milk

Milk is a nutritious material that contains both macro and micro nutrients and a huge number of active components that contribute to milk's nutritional value and consumer health (Boza and Saenz Sample a yo, 1997). Breed, age, diet, disease, lactation stage, and milking practices might alter milk content. Milk composition varies widely.

3.6 Design of the process

3.6.1 Mathematical modeling

The variety of mathematical models proposed to describe or predict the lactation curve shows its importance. The biological or economic interpretation of these models is clear [19].

3.6.2 Description of the Model

First, the time since the last milking is evaluated. The time it takes to milk cows may be decreased, giving them more time to eat, lie down, and breathe fresh air, and to go to their next grazing spot sooner. The following equation calculates how long it takes to milk the complete herd in one session (1).

$$Tvd = NQLS + Tpr \quad (3.2)$$

Where:-

Tvd is the number of minutes spent milking one cow, and N is the number of lactating cows. QLS is a milking parlor's capacity in cows per minute, and Tpr is break time in

minutes. The total time necessary for a single milking, including preparation and labor, is determined using the equation (2).

$$Tcd = Tvd + Tp + Tc \quad (3.3)$$

Tcd is the entire duration time of a single milking, including preparation work and finishing work after milking, in minutes; Tp is the amount of time spent preparing for milking in minutes; and Tc is the amount of time spent completing and cleaning after milking in minutes. If Tcd is short enough, milkers will have time to do other tasks (feed preparation, cleaning, control of animals etc.). Therefore, milking time must be considered while optimizing and choosing a milking parlor for the farm. Second, evaluate economic criteria. The ultimate direct costs of a milking parlor per cow and year UCMP must be compared. Equation (3) totals the milking labor expenses per cow and year. UCW, milking equipment expenses per cow and year UCP, comprising construction, and supply costs UCS per cow and year.

$$UCME + UCW + UCP + UCS \quad (3.4)$$

Where UCMP represents the final specific direct costs of the milking parlor in euros per cow per year, UCW represents the specific labor costs per cow and year in euros per cow per year, UCP represents the specific costs of milking equipment in euros per cow per year, and UCS represents the specific costs of supplies consumed per cow per year. Specific labor expenses UCW are determined using Equation (4) and the average milker's hourly wage. Equation can use Td if specified (5).

$$Tr = 365 * Td60 \quad (3.5)$$

Where: Tr represents the labor necessary to milk one cow per year cow1 year1; Td represents the effort required to milk one cow per day mincow1day1.

$$Td = "N * (trc + tp + tc) + Tpr * ndsN \quad (3.6)$$

Where: trc is the average net labor demand for milking per cow, mincow1, tp is the time of preparation before milking, and tc is the time of finishing and cleaning after milking. Tpr is the break duration in minutes, and n is the number of milkings each day. nds stands for "actual number of milkers," expressed as "per," while N refers to "lactating cows on the

farm." The equipment's UCP is assessed as a cow's entire operating costs. It includes the amortization of machinery, which is the purchase price expressed as a percentage of the machine's overall amortization, additional amortization of construction, which includes construction costs and a percentage of the building's overall amortization, and servicing, maintenance, and repair costs, which are typically expressed as a percentage of planned acquisition costs. UCS costs are calculated by summing the costs of all operational materials and energy. Motor power inputs, the amount of water and disinfection used, etc., all affect the amount of electricity needed. Per-cow and per-year calculations are made (EUR cow¹year¹). The rounded integrand reflects total agricultural milkers. Equation determines the number of operators needed and their placements (6).

$$Nd = \frac{QPL}{wd} \quad (3.7)$$

Where: nd—the theoretical needed number of milkers per parlor, pers.; QPL—the required milking parlor capacity, cow^{min1}; Wd—one milkers operating capacity, cow^{min1}. Maximum number of operators to avoid idle time or job problems. It's the number of milking MZ divided by the number of clusters ns that can run one milker.

$$ndm = \frac{mZ}{ns} \quad (3.8)$$

Where: -ndm is the maximum number of milkers that can work in a single parlor (in people), mZ is the number of milking's tall that can work in a single parlor (in pieces), and ns is the maximum number of clusters that can work in a single milker (in pieces). The equation denotes the theoretical number of stalls in a parlor, a key technological parameter (3.9).

$$MT = QPL(td + tv) \quad (3.9)$$

Where: mT is the notional number of milking stalls per parlor (in pcs), td is the average time it takes to milk one cow by machine (in minutes), and tv is the average time a cluster is idle (in minutes).

$$tv = tn + ts + tm \quad (3.10)$$

where t_n is the average time needed to join a cluster, t_s to detach it, and t_m to manage it. A detailed account of farms and dairies the strategy was examined using a model on three groups of farms representative of Italy's primary sector. All the information (such as building and equipment expenses, supply costs, labor costs, etc.) originated from modern Italian dairy farms. Two farms (D,E) have herringbone parlors (70 and 90 cows), while two farms (F,G) have rotating parlors. Three farms (A, B, C) have side-by-side milking parlors (50, 82, 100 cows), while two farms (D,E) have herringbone parlors (with 360 cows and 900 cows). All the farms selected breed Italian Frisian dairy cattle. Hardware determines milk quality and quantity.

3.7 Hardware Description

The working model consist of the following Hardware components,

- BNCSL-31 pH sensor.
- PH sensor board.
- Ultrasonic sensor
- Arduino controller
- Temperature sensor
- 20*4LCDDisplay.

3.7.1 Arduino controller

This thesis will only employ the most common Arduino board, the Arduino Uno. Since the Arduino Uno is open source, its designs may be freely reproduced, hence many different boards are available. Let's examine the Arduino Uno's parts.

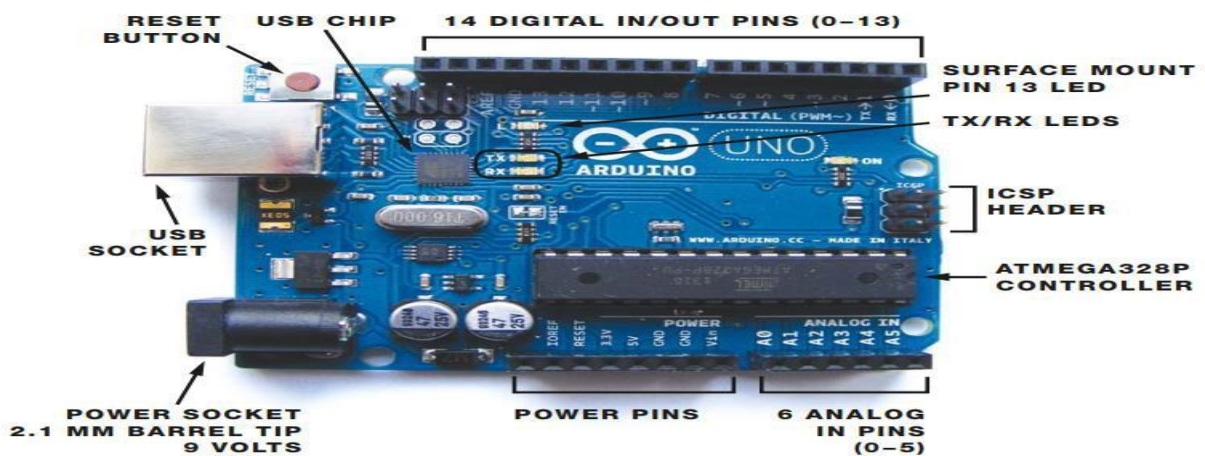


Figure3. 8 Arduino Controller

Arduino's output controls components like motors and LEDs (information sent out from the Arduino). Arduino inputs sensor data (information going into the Arduino). 14 digital input/output pins (pins 0-13). Each one might be input or output.

Power:-When you attach the Arduino Uno board to your computer to upload software, it gets electricity via the USB port. When the Arduino is not connected to your computer, you may still use it by plugging in a 9-volt AC adapter or 9-volt battery pack with a 2.1mm connection. Positive wire should be attached to the adapter's center pin. We describe an Arduino-based technique for evaluating milk quality and quantity. Real-time clock module logs milk characteristics like pH and adulteration. When choosing milk consistency, the pH level is monitored with a pH sensor. Long-term microbial activity can modify milk's fragrance. Heating milk can cause this.

3.7.2 Main Components of the System

This Arduino Uno setup includes the following components: This method incorporates UNO. Microcontrollers include Arduino Uno. It's a hybrid hardware/software platform for electrical development. USB pre-programming is possible. AT mega 328P is its microcontroller. Digital I/P and O/P pins, analog I/P pins, 16MHz ceramic resonators, USB, power connector, and set button are supplied. Connecting modules and sensors is easy. 5V DC powers the gadget. An inexpensive microcontroller board runs the gadget. It delivers faster, more reliable outcomes.

3.7.3 pH sensors.

A pH sensor monitors hydrogen ions in water or liquid. The pH scale measures a substance's acidity or basicity.

$$pH = -\text{Log}[H^+] \quad (3.11)$$

Each liquid's pH reflects its properties. Unadulterated milk's pH is 6.7 to 6.9. It depends on the cow's breed, lactation period, and food. Milk's pH can change, especially if it's tampered with. pH sensor was used to measure milk pH. Abnormal milk pH is outside these values. Abnormal milk causes health problems. pH is calculated from the hydrogen ion concentration in water. One pH unit changes for every 10-fold change in hydrogen ion concentration. The pH scale measures acidity or baseness in gaseous solutions. $pH = -\log [H^+]$ It's the negative of the base-10 logarithm of the hydrogen ion concentration in moles per liter. It's the inverse of the hydrogen ion's base-10 logarithm

activity. pH ranges from 1 to 14. Lower-pH solutions are acidic, whereas higher-pH solutions are basic. Water's pH level is 7, making it neither acid nor basic. Temperature and other variables influence a liquid's pH value. The pH of milk is 6.5 to 6.7; anything above or below this range indicates a quality issue. Here, a pH sensor monitors. Here's the pH sensor.



Figure 3. 9 pH sensor

Glass pH electrodes. The standard model is a glass tube with a bubble attached. In most situations, silver chloride-coated wire is immersed in a buffered chloride solution inside the electrode. Internal solution pH may vary from 7.0 to 1.0 (0.1M HCl) (different buffers used by different producers). Glass bubble is the electrode's functioning part. The tube's walls are thick, yet the bubble is thin. Internal and external solutions protrude the glass surface to achieve balance. Advertisements or bed protons charge both sides of the glass, causing a potential difference. The Nernst equation explains this potential, which is proportional to the pH difference between the two solutions. Most commercial pH electrodes are combos. These electrodes feature a glass H⁺ ion sensitive electrode and an additional reference electrode. To build a combination electrode, measure the potential difference between the glass electrode's two surfaces. This potential difference is caused by pH measurement techniques. This requires a closed circuit. Internal, external, and pH solutions complete the circuit. For precise and consistent readings, the reference electrode must be kept isolated from the solution to prevent cross-contamination. Connecting and isolating two solutions isn't easy.

3.8 Ultrasonic Sensor (HC-SR05).

Ultrasonic milk analyzers can produce accurate and reliable assessments of cow, sheep, and other milk liquids. The Vcc terminal is powered by 5V. From here, a trigger pulse causes the

sensor's range mode to activate more often to recognize objects. Echo sends a signal if a type n item is found. A signal indicates successful detection.

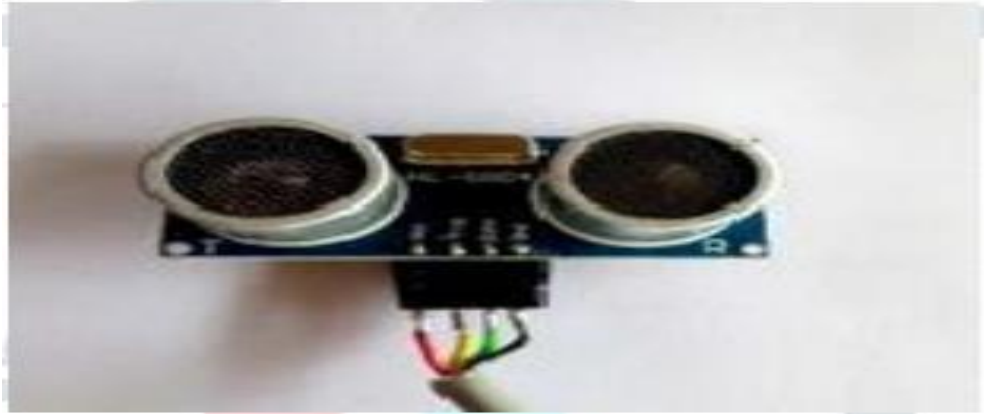


Figure 3. 10 Ultrasonic sensor

3.9 LCD display.

This LCD used 20 by 4 characters. This is a 20-character, 4-line display. Here are the final class and grade figures. LCD is a flat panel display that uses liquid crystals to modulate light (LCs). LCs don't emit light. They're used in computer monitors, TVs, instrument panels, aviation cockpit displays, signage, and other places. They're in video players, game consoles, clocks, watches, calculators, and phones. LCDs have replaced CRTs in most applications (CRTs). Because they don't employ phosphors, they don't have picture bum-in like CRT and plasma displays. LCDs have picture persistence issues. LCDs are more energy-efficient and recyclable than CRTs. Because it consumes little power, it may be used in battery-powered electronics. It's an electrically modulated optical device that uses liquid crystals to generate color or monochrome images. These segments generate pictures when put in front of a backlight or reflector. The LCD view is 76 mm by 26 mm and the device is 3.9 inches wide and 2.35 inches tall.

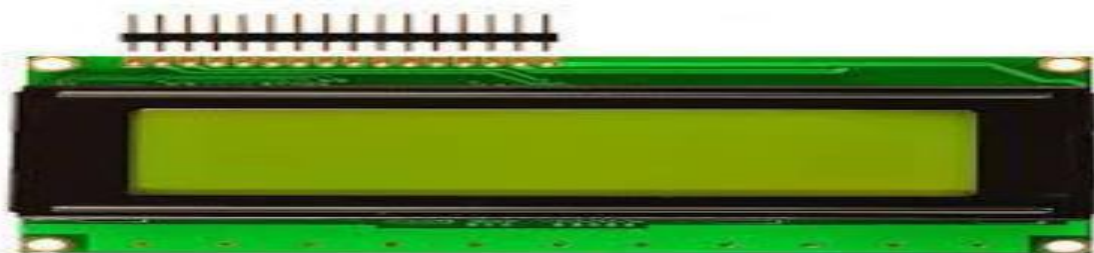


Figure 3. 11 LCD display

Finally, the microcontroller's calibrated values of the input samples will be shown on the LCD panel, along with an evaluation of the milk's quality based on the measured characteristics.

3.10 Temperature sensor.

Milk has its unique storage temperature requirement; when mixed with water or other dangerous components, the temperature will not be normal. Milk has temperature requirements. Higher or lower temperatures cause bacteria to develop, rendering milk unsafe for ingestion. Pre-wired and water proofed DS18B20 temperature sensor. It detects milk temperature variations. The sensor's accuracy is maintained up to 125°C, however the PVC-encased cable shouldn't exceed 100°C. Digital signals don't degrade over long distances since they're digital. The on-board digital-to-analog converter on these one-wire digital temperature sensors can deliver 12 bits of precision. Many ones can be connected to one pin. Each has a unique 64-bit ID burned in to distinguish 3.0-5.0V systems. They operate with any single-digit microcontroller.



Figure 3. 12 Temperature sensor

3.11 Software design of quality and quantity of milks.

Arduino software programming

3.11.1 Software Requirement.



Figure 3. 13 Arduino software

Arduino's IDE is written in Java. This app is cross-platform. It's used to build and upload programs to Arduino-compatible boards, but it may also be used with third-party cores on other vendor boards. Arduino's cross-platform IDE uses Java (it may run on Windows, macOS, and Linux). Arduino's IDE supports C and C++ and organizes code using unique principles. The IDE source code is licensed under GNU GPL 2.3. Arduino IDE supports C and C++ by using specific rules for code structuring. The Arduino IDE offers a Wiring software library. This library includes typical I/O operations. The user-written code just needs two functions—one for initiating the sketch and another for the main program loop—which are built and linked with programs `main ()` using the GNU tool chain, which is available with the IDE. Arduino's IDE uses `avr-g++` to convert executable code to hexadecimal text. A loader program on the Arduino board uses this file to load the code.

3.11.2 Programming the Arduino

Programming the Arduino to do certain actions is important to achieve our goals. We utilize Arduino's IDE to do this (IDE). The Arduino IDE is free at <http://www.arduino.cc>. Windows, OS X, and Linux are supported. It allows you to write computer programs (called sketches) that you can upload to an Arduino board through USB. Your Arduino will follow the instructions based on its environment.

3.11.3 The IDE interface

When you launch the Arduino IDE, you'll see three windows: a code or sketch window, a Serial Output window, and a tool bar with the most-used buttons. Messages transmitted between your computer and Arduino will be shown in the serial Output box if your sketch doesn't build successfully.

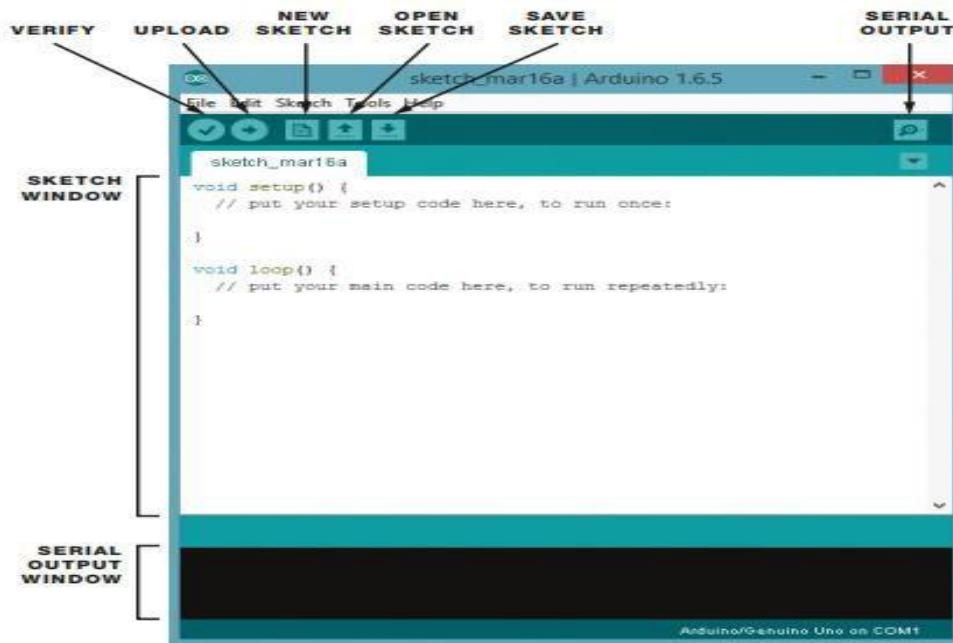


Figure 3. 14 Arduino

A library contains code. You may avoid inputting this code many times by adding a command that pulls it from the library. This shortcut saves time and makes it easy to connect sensors, displays, and modules. The Arduino IDE includes pre-installed libraries, such as the Liquid Crystal library, which makes communicating with LCD screens easy. There are several online libraries. The procedure requires the following libraries: RFID, Tone, Pitch, Keypad, Password, Ultrasonic, New Ping, and DHT. <http://www.nostarch.com/arduino-handbook/> has all the libraries you need. Older Arduino versions need unzipping the library file. After that, copy the entire folder into sketch book/libraries on Linux, My Documents/Arduino/Libraries on Windows, or Documents/libraries on OSX. To manually install a library, open its ZIP file in its folder. If you wanted to install a library named keypad and it arrived in a zipped file named keypad.zip, you would decompress it to create a folder named keypad. This folder would include keypad and keypad.cpp. After opening the ZIP file, drag the keypad folder into your OS's libraries folder. Linux sketch book/libraries; Windows My Documents Arduino Libraries; OS X Documents/Arduino/libraries. Restart Arduino. Libraries are stated at the beginning of a drawing and start with # include. Libraries are denoted by < > and the en dash, as in the following call to the Servo library: #include <servo.h> Installing the procedure's libraries now will save time afterwards. Install it. Arduino: LED flash let's get started with Arduino fundamentals by constructing an LED flash (LED). This will introduce you to a basic sketch and is the easiest way to test your Arduino. As I've explained, a drawing is just computer instructions. Once your sketch is posted to Arduino, it will run automatically until you upload a new one. Because the Arduino can only hold a single sketch, it will run until you upload a new one. This approach uses the Arduino IDE's Blink sample program. This software lights an LED for one second then turns it off for the same length of time. LEDs emit light when supplied a modest current. The longer wire must be linked to positive electricity because the LED only works in one direction. Current-limiting resistors prevent LEDs from overheating and burning out. Built-in resistor connected to Arduino pin 13.

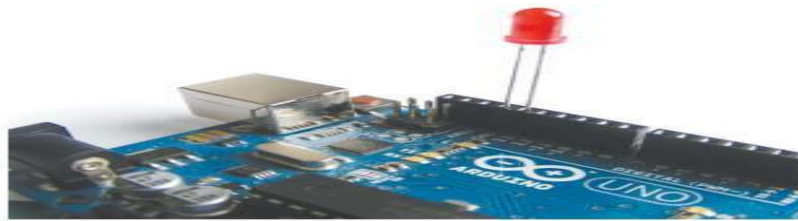


Figure 3. 15 Blinking LED

1. Insert the long positive leg (also known as +5V or anode) of the LED into pin 13 on the Arduino, as shown in Figure. Connect the short negative leg (also known as cathode) to the GND pin next to pin 13.
2. Blinking LED. Connect the Arduino to your computer with the USB cable.
3. Enter the following sketch into the IDE.

The calibration of pH meters

This page covers pH meter calibration, including the pH glass electrode, ISE electrodes, and buffers, and general calibration background. Understanding pH, pOH, and electrode mechanisms is emphasized. This article presents new concepts concerning pH, pOH, activity, and activity coefficients. Solid-state pH electrodes and a conducting wire have opened up new pH measuring options. Combining a pH buffer solution with a conducting wire creates a reliable reference electrode. The infinite linear Nernst and slope are deceiving. Changing the isoelectric point is characterized by three nonlinear calibration curves spanning 0–14 pH. The potential measurement with stirring run and double layer (DL) and triple layer (TL). Relativistic approaches dominate instrument-based analysis. A solution's physical or chemical property allows equipment to detect era signals. pH meters measure electrode potential, which must be related to hydrogen ions (H^+) or hydroxyl radicals (OH^-) in the solution. Compare the readings to H^+ or OH^- buffer standards. To get trustworthy pH meter results, calibrate it. Calibration of pH meters involves creating a linear operating curve, or calibration curve. This curve is plotted versus pH or pOH. Most published calibration explanations are confused and deceptive. We'll cover pH, pOH, pH glass electrodes, reference electrodes, standard buffers, and pH meters. The Boltzmann equation suggests a non-faradaic electrode potential mechanism under a stirring precondition.

$$\frac{N_i}{N_o} = \frac{\exp(-izi ieE)}{T} \quad (3.12)$$

N_i , N_o , izi , ie , and E represent ions on the electrode surface and in the solution, as well as the electron charge and potential. Constants K and T . Modified Boltzmann equation given for counter-on triple layer effect [29, 36]:

$$E \text{ not stirrred} = 2.3 \left(\frac{KT}{zi} \pm ie \right) \log \left(\frac{N_i}{N_o} \right) - E_c * t_i \quad (3.13)$$

The city effect is a novel observation, thus the original Boltzmann distribution equation didn't include it. Symbol also symbolizes ion's net charge. Sensitivity The assertion that most pH meters are sensitive to 0.001 pH appears exaggerated. Without considering the glass electrode's surface, interface, double and triple layers, etc. [14]. If the meter's voltage measuring capability is 0.1 mV and its pH slope is 60 mV/pH, then its sensitivity is 0.0017 pH. This is the computed deal sensitivity, but it doesn't account for slope-changing variables. Any pH meter can possibly measure a 7.001 pH sample, although it's improbable. The neutral range's nonlinearity must also be considered. Calibration may allow pH 0.01 sensitivity [4, 5, 7]. pH 0.001 is seldom tested. From this vantage point, 0.05916V/ pH is irrelevant to the topic. 59.16 mV/ pH is an unusual calibration slope. If you want a delicate slope, try amplification [27, 28, 30]. Four pH electrodes can yield 230 mV/pH slope [27]. pH meter reading: 7.0004 This needs more research. Chemical amplification is based on a growth in capacitor electrode surface charge density.

$$E_{total} = E_1 + E_2 + \dots E_n \quad (3.14)$$

Suspension Effect The suspension effect has been reported and explained [23]. Negatively charged colloidal particles raise pH. Researchers should filter, centrifuge, or otherwise remove colloidal particles from samples. Clay soil pH may be easily measured using pH paper or dye. Because H^+ coagulates with colloidal, acidic milk pH is easy to measure. Suspensions, emulsions, and foams may alter pH readings. Extreme vigilance is needed when determining biological samples' pH or pI. Polyaniline solid state pH electrodes may be better [30]. Tests are needed. Frequency Every two to three hours, the pH meter must be calibrated using points around the sample solution's pH. pH electrodes typically last three years [7]. A hermetically

sealed Ag/ Ag Cl container may last longer. Before calibration, clean the glass electrode with water. If not, try an acid or organic solvent. If there are solid particles on the glass, wipe them with a damp paper towel and wash the glass to remove residue. Unused electrodes should be immersed in water. Either option is valid since the electrode has a capacity or is readily grounded. Touching the electrode surface should reset the pH meter to zero voltage. First disconnect it and then gradually recharge it to establish the balancing time (for approximately one minute).

CHAPTER 4

RESULT AND DISCUSSION

4.1 Results

In order to pledge the distribution of safe and quality milk product to buyers or consumers, the adjusting control of milk quality and milk quantity must be implemented. To assure that milk quality tester improve the main milk quality problems at herd level. Unless the increased number of clinical mastitis, high somatic cell counts, high bacteria counts and antibiotic residues in unsafe or unchecked milk. The evaluation of 0.571Liters milk at suro Area is 6.69PHvalues.This type of milk is very comfortable and good for human heaths.

4.1.1 Milk samples

Sources include fresh and tainted milk samples.

- a) Raw milk First, 80 milliliters of fresh milk are placed in a glass. This milk's pH is between 6.5 and 6.8 and it smells good. The fresh milk sample is dipped into each sensor in the sensor block and then tested.



Figure 4. 1 Fresh milk

As we know the standard value of pure water that doesn't mixed with other organ pH value is range from 6.1 to 6.8. Based on this we have evaluate six milk production area in Bule Hora town i.e. Dugda Dawwa, Garba, Suro, Suruba and Malka Soda The quantities of all milk are 0.5 up to 1 liters.

4.1.2 Evaluation Results of Milks at Dugda Dawwa Area



Figure 4. 2 Evaluation result of 0.67 liters of milks at Dugda Dawa

As we have seen from the figure above, evaluation results of dugda dawa milks have 6.92 PH value at 0.67 liters. The outputs of these milks are out of ranges of the given standards. It's contaminated and cause of malfunctions of organs, cancers, kidney disease and etc.

4.1.3 Evaluation Results of Milks at Garba Area

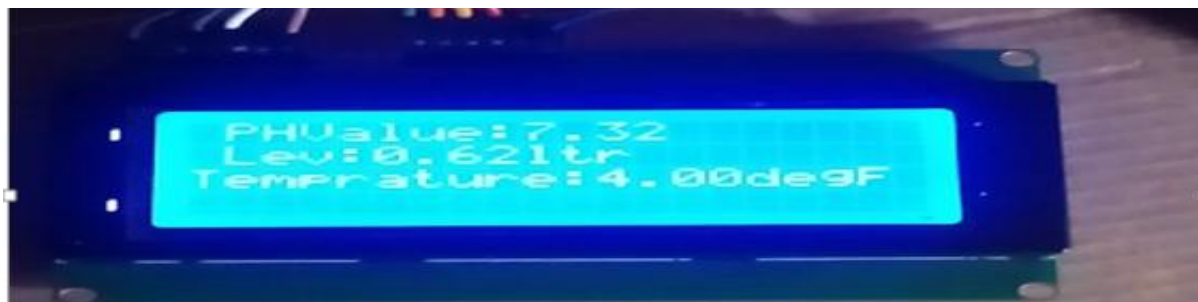


Figure 4. 3 Evaluation result of 0.62 liters of milks at gerba Area

4.1.4 Evaluation Results of Milk Products at Suro Areas

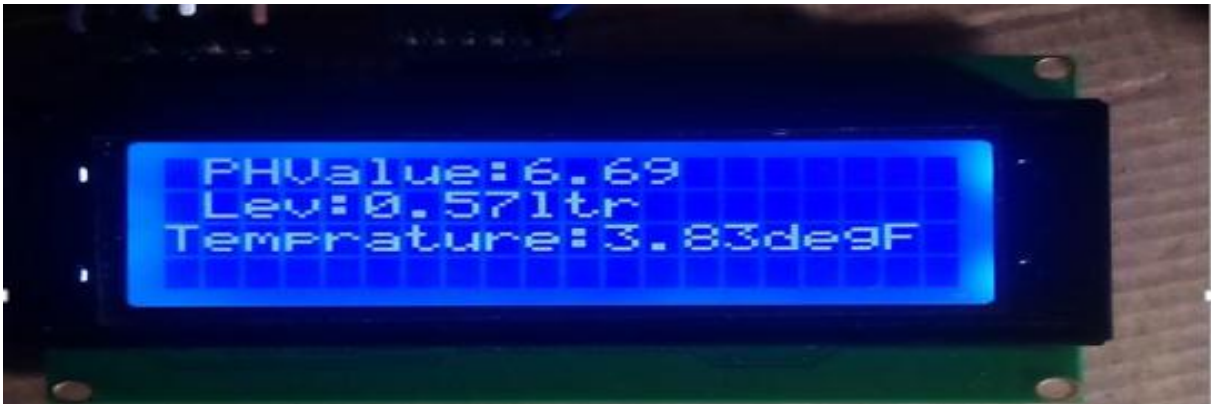


Figure 4. 4 Evaluation result of 0.57 liters at suro area

The evaluation of 0.571Liters milk at suro Area is 6.69PHvalues.This type of milk is very comfortable and good for human healths.

4.1.5 Evaluation Results of Milk Products at Suruba Areas



Figure 4. 5 Evaluation result of 1.12 liters milks at suruba area

4.1.6 Evaluation Results of Milks at Malka Soda area



Figure 4. 6 Evaluation result of 0.62liters milk at melka soda area

4.1.7 Analysis and Evaluations of Five Different Areas of Milk around Bule Hora Town

Table 4-1.Evaluation of five different area of milk production around Bule Hora Town

Areas	PH Value reading	Liters	Temperature in Deg Fahren and Deg C	PH Standard Ranges
Dugda Dawa	6.92	0.67ltr	35 degree centigrade up to 40 degree centigrade	6.1 up to 6.8 good milk type
Garba	7.32	0.67ltr	35 degree centigrade up to 40 degree centigrade	6.1 up to 6.8 good milk type
Suro	6.69	0.57ltr	35 degree centigrade up to 40 degree centigrade	6.1 up to 6.8 good milk type
Suruba	7.05	1.12ltr	35 degree centigrade up to 40 degree centigrade	6.1 up to 6.8 good milk type
Melka Soda	7.32	0.62ltr	35 degree centigrade up to 40 degree centigrade	6.1 up to 6.8 good milk type

4.2 Discussions

In all five areas of Bule Hora Town, we have evaluate the qualities of 0.5 up to 1liters by using Arduino Programs. From the result clearly observed that Suro Milk production area is produce more accurate milk, which is comfortable and healthy for human body followed by Dugda Dawa. Despite of Dugda dawa, Garba, Surba and Malka Soda areas produce contaminated milk leads to malfunctions of human organs, Kidney failures, and heart breaks disease and so on. Therefore based on my prototype results Suro milk production is better than other four production areas.

CHAPTER FIVE

RESULTS AND DISCUSION

5.1 Conclusion

This paper proposes a low-cost, efficient milk parameter detection and analysis system utilizing Arduino. Arduino built the system. The new system is lighter, smaller, uses less power, and reacts faster than its predecessor. Portable programs can utilize it. Future work will focus on improving the system's accuracy. Make the system portable (design micro atomization) so it may be used in the field. This page summarizes the numerous uses. This investigation will assist researchers understand the difficulty of milk adulteration and develop a solution. This research used project analysis to propose and evaluate a portable device to analyze milk quality and quantity. This thesis introduces milk products from several places before focusing on Bule Hora's milk issues.

Then set the General and specific objective that can be fill the gap found in review of related works. Then analyze, design and prototyping of device indicate milk quality and quantity productions in five areas of Bule Hora Towns. From the result clearly observed that Suro areas milks quality based quantity is very important for human health, strength and comfortable than other four areas of milks and followed by Dugda Dawa.

5.2 Recommendation

The research forwards the following recommendations for the manufacturer, agriculture experts, and research institutes to solve the prevailing farmers' problems of the study area as well as other parts of the country.

To the manufacturer: Manufacturers of agricultural inputs especially those who deal with automation of agriculture are recommended to manufacture the hardware to introduce automation into milk production activities to increase yield of productivities, make easy the labor of farmers, and provide farmers with spare time that can be utilized for other productive and revenue-generating activates.

For milk production experts: Milk production experts or rural development workers should inform and work together with higher government bodies and agencies that work towards modernizing agriculture, especially diary production development projects so that automation is applied in agriculture to ensure efficient utilization of diary production resources which can increase the yield of all resources and there by improve the livelihood of the rural population.

For Engineering Research institutes: This research Work is just a stepping stone built on similar developments so that it can serve small animals holdings as the majority of the dairy production in the research area is fragmented. Therefore, as the technology requires improvement and additional features that have not been touched by the researcher, Universities and research centers are required to improve current development to make It more viable.

Researchers and technologists who work in the field of automation of agriculture are required to work in such agricultural activities concerning detection of different diseases, and occurrence of pests, and treatment of them with minimum human intervention.

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Appendix

Arduino Codes

```
//includethelibrarycode:
#include<OneWire.h>
#include<DallasTemperature.h>
#include<LiquidCrystal.h>
//theultrasonicsensorpinsare
//Connectedtopins10and11oftheArduino
#defineTRIGpin10
#defineECHOpin11
//themotorandbuzzerareconnectedto
//Pins13respectively
#definebuzzer13
//Datawireispluggedintodigitalpin2ontheArduino
#defineONE_WIRE_BUS2
//SetupaoneWireinstancetocommunicatewithanyOneWiredevice
OneWireoneWire(ONE_WIRE_BUS);
//PassoneWirereferencetoDallasTemperaturelibrary
DallasTemperaturesensors(&oneWire);
//initializethelibrarybyassociatinganyneededLCDinterfacepin
//withthearduinopinnumberitisconnectedto
constintrs=12,en=6,d4=5,d5=4,d6=3,d7=2;
LiquidCrystallcd(rs,en,d4,d5,d6,d7);
```

```

floattime=0,distance=0;
constintanalogInPin=A1;
intsensorValue=0;
unsignedlongintavgValue; floatb;

intbuf[10],temp; voidsetup()

{

//sensors.begin();   Serial.begin(9600);
lcd.begin(20,4);
pinMode(TRIGpin,OUTPUT);
pinMode(ECHOpin,INPUT);
pinMode(buzzer,OUTPUT);
lcd.print("PleaseWait...");
delay(1000);

lcd.clear();      lcd.print("System");
lcd.setCursor(0,1);
lcd.print("GettingReady");
delay(2000);

lcd.clear();

}

voidloop()

{
for(inti=0;i<10;i++)
{

buf[i]=analogRead(analogInPin); delay(10);

}

for(inti=0;i<9;i++)

```

```

{
for(intj=i+1;j<10;j++)
{
if(buf[i]>buf[j])
{
temp=buf[i];
buf[i]=buf[j];
buf[j]=temp;
}
}
}

avgValue=0; for(inti=2;i<8;i++)
avgValue+=buf[i];

floatpHVol=(float)avgValue*5.0/1024/6;
floatphValue=-5.70*pHVol+21.34;

//Sendthecommandtogettemperatures
sensors.requestTemperatures();

lcd.setCursor(0,1);

//printthetemperatureinCelsius
Serial.print("Temperature:");
Serial.print(sensors.getTempCByIndex(0));
Serial.print((char)176);//showsdegreescharacter
Serial.print("C|");

delay(500);

//setthecursortocolumn0,line1

```

```

//(note:line1isthesecondrow,sincecountingbeginswith0):

//lcd.setCursor(0,1);

//printthenumberofsecondssincerereset:

//ItfirstsetstheTRIGpinatLOWfor2microseconds
digitalWrite(TRIGpin,LOW); delayMicroseconds(2);

//ItnowsetsTRIGpinatHIGHfor15microseconds
digitalWrite(TRIGpin,HIGH);    delayMicroseconds(10);
digitalWrite(TRIGpin,LOW);

//ItwillreadtheECHOpinandwillreturnthetime time=pulseIn(ECHOpin,HIGH);

//distanceformula

distance=time*0.017;//(speedinmicroseconds)

//Speedofsoundwave(340m/s)dividedby2(forwardandbackwardbounce)

//TodisplaythedistanceonSerialMonitor
Serial.print("Distance:");
Serial.print(distance);

//Serial.println("cm");//sp
floath=(11.07-distance);
Serial.print("Level:");
floatL=(h*40.96*3.14); lcd.clear();
lcd.setCursor(1,0);
lcd.print("PHValue:");
lcd.print(phValue+0.3);
lcd.setCursor(1,1);

//lcd.print("Lev:");
lcd.print(L*0.001);

```

```

//lcd.print("ltr");    delay(1000);
Serial.println(L*0.001);

if(phValue>=6.5||phValue<=6.7)
{
digitalWrite(buzzer,LOW);
lcd.clear();

lcd.setCursor(0,1);    delay(2000);
digitalWrite(buzzer,LOW);
delay(3000);

temp=1;
}

elseif(phValue>6.5||phValue==6)
{
digitalWrite(buzzer,HIGH);    lcd.clear();
lcd.print("LOWMILKQUALITY");

lcd.setCursor(0,1); delay(2000);
}}

```

Arduino code for LED

4. **int led=13;**
5. **void setup ()**
6. **{**
7. **pin Mode(led, OUTPUT);**
8. **}**
9. **void loop()**
10. **{**
11. **digital Write(led, HIGH);**

```
12. {  
13. delay(1000);  
14. digital Write(led,LOW);  
15. Delay (1000);  
16. }
```

To verify the drawing, click the checkmark shaped Verify icon.

- Click the upload button to send the Arduino program.