TITLE –

To identify the Milk distribution system and hygiene practices among small dairy farms in Jaipur.

INTRODUCTION –

Milk and milk products have been important human food items for centuries. Milk is mostly obtained from cows, goats, and sheep.

Milk from dairy cows has been regarded as nature's perfect food, providing an important source of nutrients including high quality proteins, carbohydrates and selected micronutrients. More than 95% of the cow milk proteins are constituted by caseins and whey proteins. Among the caseins, beta casein is the second most abundant protein and has excellent nutritional balance of amino acids.

Milk quality refers to a combination of characteristics that enhance the acceptability of the milk product. Quality relates to chemical, physical, technological, bacteriological and aesthetic characteristics of milk and milk products.

Milk safety and quality assurance has become an area of priority and necessity for consumers, retailers, manufacturers and regulators. Changing global patterns of food production, international trade and public expectations for health protection have created a huge demand for food safety. Globally, the incidence of food borne diseases is increasing and international food trade is getting disrupted by frequent disputes over food safety and quality requirements. The quality of raw milk has a direct impact on the quality of product prepared from it.

Until 2002, cooperatives traditionally were the dominant players in the formal sector. With liberalization of the dairy industry, private investment has increased quite significantly. However, the organized sector’s share in milk procurement is very low because a large proportion of the milk and milk products are sold through the informal channel. The informal demand absorbs approximately 41 percent of the milk and milk products produced in the country, accounting for about 75 percent of the marketable surplus of milk.

The informal sector consists of the village milk vendors who procure loose milk from farmers and sell it in urban and peri-urban areas directly to consumers, small private

processors or hotels. The quality of the vendors' milk and milk products is not guaranteed. Largely sold in loose form, it is often adulterated with several additives to control spoilage.

For a proper milk value chain, a systematic approach to quality care is needed, focusing on each individual link in the production chain. Every participant in the dairy supply chain must be responsible in developing this quality system. The authorities are required to continuously monitor the quality of products and production processes to ensure compliance with applicable rules and regulations.

Organisms from human carriers, the environment, milk-producing animals, or other animals have been agents of milk - borne disease including the following: Milk borne infections - Bovine tuberculosis, Brucellosis, Anthrax, Salmonellosis, Listeriosis, Leptospira infection, Q fever, Foot and mouth disease, Toxoplasmosis.

Contamination of milk by human beings - Septic sore throat and diphtheria, Typhoid fever, Paratyphoid fever, Infectious hepatitis, Polio infection, Enteritis, Amoebiasis, Giardiasis.(1)

Studies of total bacteria count could indicate at what level milk was contaminated and what effect contamination has on milk quality when milk reaches the consumer.

The measure of milk temperature and pH is a simple test which small-scale dairy processing units could manage. Milk pH gives an indication of milk hygiene and milk pH should not be lower than 6.6 or higher than 6.8 when milk temperature is 20°C. Cooling milk after milking reduces the risk for the growth of milk bacteria and high milk temperatures must be considered as favourable to the growth of bacteria in the milk. The high milk temperature in both areas increases the risk of bacteria.

SCC (Somatic cell count) in milk includes both white blood cells and epithetlial cells that slough off from the lining of the mammary gland during the normal course of milking. SCC is related to incidence of mastitis and it is therefore a good measure of udder health. A high SCC indicates an udder health problem and milk with a high SCC is known to have shorter shelf life due to high activity of enzymes and high SCC also causes other problems for the dairy industry.(2)

PROBLEM STATEMENT –

A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Animals thus play an essential role in maintaining zoonotic infections in nature. Zoonoses may be bacterial, viral, or parasitic, or may involve unconventional agents. As well as being a public health problem, many of the major zoonotic diseases prevent the efficient production of food of animal origin and create obstacles to international trade in animal products.(3)

Good dairy management practices will ensure that milking routines do not harm the animals or introduce contaminants into milk, that milking is carried out under hygienic conditions and that the milk is handled properly after milking. Milk from a healthy udder contains only few bacteria, but milk is a perishable product which is very easily contaminated and invaded by bacteria. The contamination of milk can occur at different stages in the milking procedure and from different sources, mainly from the external surface of the udder and teats, and from the surface of the milking utensils.

Milking hygiene has an impact on the hygienic quality and shelf-life of the milk, but also on the occurrence of mastitis and risk of spreading mastitis infections. Mastitis, in turn, negatively affects milk yield, composition and quality. For small-scale farmers to be able to practice good milking routines it is of great importance that they are given proper advice and assistance.(4)

REVIEW OF LITERATURE –

Milk is an essential part of diet for both human and animals. And milk quality management is important step to control zoonotic diseases. India had shown increased milk production from 307(2013-14) to 322(2014-15).(5)

There are many studies conducted worldwide on evaluation of milk hygiene and to understand its complex value chain.

A cross-sectional study was carried out in Somali Regional State of Ethiopia to investigate the hygienic milk handling practices, bacterial loads across different sampling points in the market chain. The results of the study indicated that the cow milk produced and distributed in the study area can generally be considered as

substandard in quality and the consumption of unpasteurized milk carries an important public health risk.(6)

A survey study was carried out around two large cities in Burkina Faso to contribute to the understanding of the situation of local milk production and milk processing. It was concluded that more extensive supplementation of diets and cross-breeding would improve milk production in Burkina Faso. Furthermore, milk cooling systems on farm and at dairy processing level were needed.(2)

A survey study was conducted in Ezha district of Gurage zone to understand the hygienic practices during production and further handling of milk and milk products; and their utilization. And it results in lack of clean water for cleaning purpose; limited knowledge on hygienic handling of milk and milk products; and unimproved milk processing materials were the three major constraints reported by the respondents according to their importance. Recognizing the importance milk and milk products to the producing household nutrition, health and income, development interventions were required to boost production, improve the quality of the products and efficiency of the traditional milk processing equipment. (7)

Another study was conducted at peri-Addis Ababa districts of Oromia with the aim of assessing hygienic status, knowledge gap, constraints affecting production, marketing and consumption of milk. The major challenges of milk production and marketing in the areas were; feed shortage, high feed cost, disease, shortage of land for grazing, and price fluctuation during fasting season, long term contract for milk marketing and milk quality.(8)

OBJECTIVE –

1. To identify the distribution system among the small dairy farms in the peri-urban area of Jaipur.
2. To evaluate milk hygiene practices among small dairy farmers under identified distribution system (for e.g. supplier, distributors, end-user etc.).
3. To check the presence of mastitis in milking animals (Keno test, temperature and pH).

METHODOLOGY –

- Study area – This study was conducted in a peri – urban area in Jaipur (Rajasthan).
- Study population – Person involved in distribution channel for e.g. milk suppliers, distributors, households (end - user) etc and milking animals on small dairy farms.
- Study design – Cross – sectional study and observational study.
- Study period – Six month.
- Sampling – Snowball Sampling was used for identification of distribution system under small dairy farms. Further all possible suppliers were interviewed till the repetitions occurred.

Sampling Design

S.No	Sample	Sampling technique	Sample Size
1	Supplier	Snowball sampling was used to identify the supplier which was involved in distribution system.	30
2	Distributers	Snow ball sampling was used to identify distributers from their respective suppliers.	10
3	Consumers	Snow ball sampling was used to identify consumers from their suppliers and distributors.	40
4	Milking Animals(cow's and buffalos)	From every small dairy farms one cow and one buffalo was selected randomly and it was found that few dairy was not having any buffalos for testing of mastitis.	Cows – 30 Buffalos – 28

- Data collection Tool – Questionnaire was used for evaluation of hygiene practices through variables such as Washing of udder, washing of utensils, Teat dipping, Washing of hands etc.

S.No.	Types of Samples	Data Collection Tools	
1	Supplier	Questionnaire	Checklist
2	Milk Distributer	Questionnaire	
3	Consumers (end-user)	Questionnaire	
4	Milking Animals (Cow's and Buffalos)	pH, Temperature and Keno Test for Mastitis	

The checklist having a list of variables to evaluate the hygiene practices among study participants.

S.No.	Checklist Variable	Evaluation Criteria
1.	Milking area is clean	
	Floor	1. Cleaned – Floor is washed with water. 2. Not cleaned – Floor is not washed with water.
	Urine	1. Present – Urine is present where milking animals are placed. 2. Not present – Urine is not present where milking animals are placed.
	Manure	1. Present – Manure is present where milking animals are placed. 2. Not present – Manure is not present where milking animals are placed.
	Uterine discharge	1. Present – Presence of uterine discharge near and inside the farm. 2. Not present – Non-presence of uterine discharge near and inside the farm.
	Dirt	1. Present – Presence of dirt near milking animals. 2. No present – Non-presence of dirt near milking animals.
	Hairs	1. Present - Presence of Hairs near milking animals. 2. No present – Non-presence of Hairs near milking animals.
2.	Milking animals are clean	
	Teat	1. Clean – Dirt is not present on teat, no cuts of teats, no redness,

		no bleeding. 2. Dirty - Dirt is present on teat, cuts of teats, redness, bleeding.
	Body	1. Clean - Free of ticks, manure and urine on body. 2. Dirty – Ticks on body, presence of manure and urine.
	Udder	1. Clean – No swelling, no redness, no manure on udder, no flies, no milk traces. 2. Dirty – Swelling, redness, presence of manure, flies, milk traces on udder.
3.	Presence of clean water	Yes – Transparent water for cleaning and drinking for animals at their storage area. No – no transparency of water at storage area, presence of mud and food materials of animals.
4.	Utensil are clean	Yes – No milking samples on utensil, no mud and no cleaning solution. No – Presence of milk, mud and cleaning solution after wash and if they had not washed.
5.	Feeding is done properly	Yes – Proper food availability at farms and presence of food at feeding area. No – No food availability and absence of food at feeding area.
6.	Proper transport vehicle	Yes – Proper vehicle according to the production of milk per day i.e., more production is directly proportional to heavy vehicle. No – light vehicle for the high milk production.
7.	Presence of shed to the animals	Yes – Proper shedding at the resting area for animals. No – No shedding at resting area of animals.
8.	Proper ventilation inside the farm	Yes – Proper openings inside the roof for animals like windows and gates. No – No openings inside the roof for animals.
9.	Milking of cows done	Outside the roof – Milking is done in open which is Unhygienic way of milking and cause bacterial growth. Inside the roof – Milking is done inside the roof.

EVALUATION CRITERIA FOR TESTING BY CALIFORNIA MASTITIS TEST KIT–

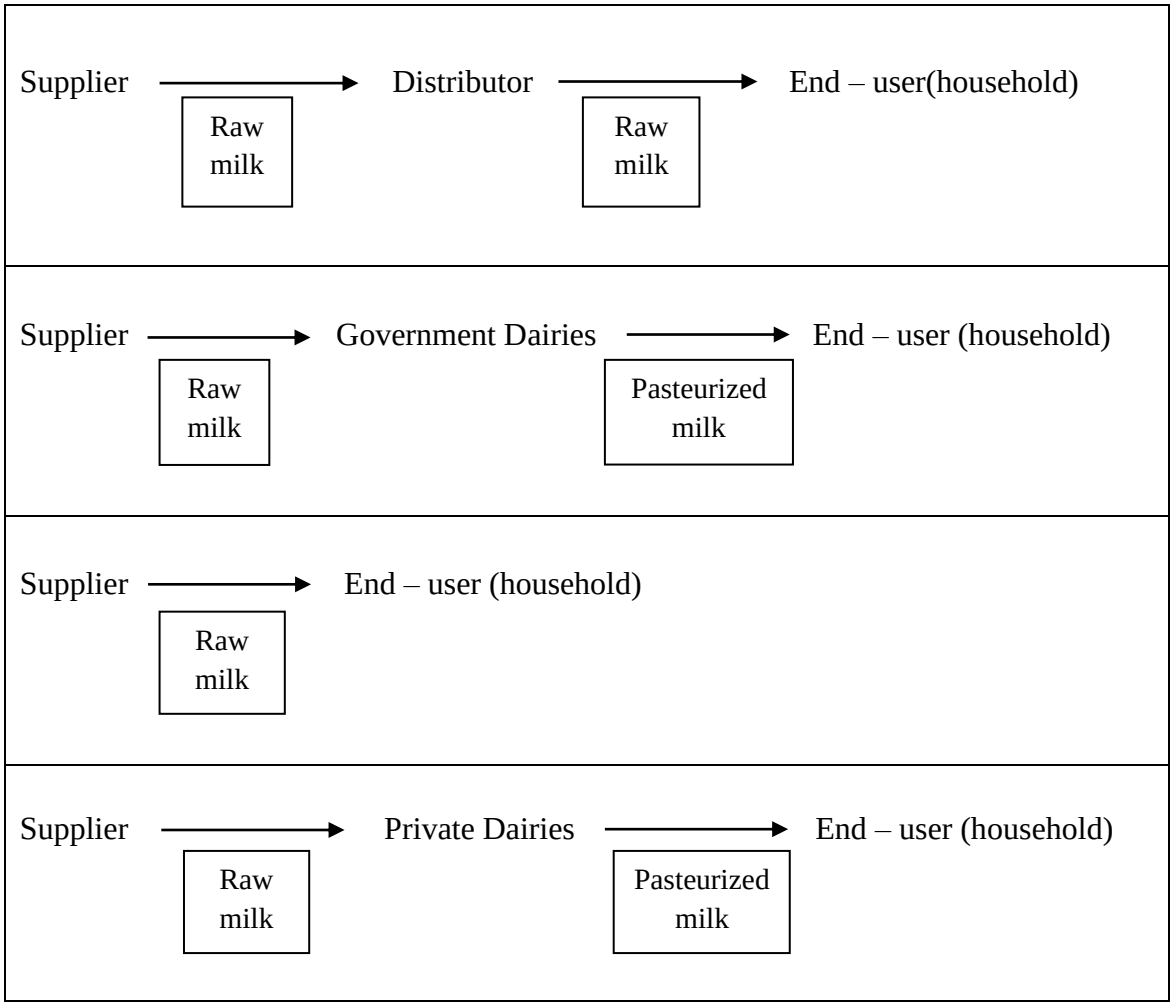
S.No.	Results	Criteria
1.	CMT (–) – (0-200,000)	Liquid mixture without gel
2.	CMT 0 – (>200,000-500,000)	Light gel visible by transparencies, Will disappear after 10 seconds
3.	CMT 1 – (500,000 – 10,00,000)	Visible light gel by transparencies, persistent
4.	CMT 2 – (1,000,000 – 5,000,000)	Visible gel Adhesion to the cup – vacuous filament
5.	CMT 3 – (>5,000,000)	Strong gel like the egg white

- Statistical analysis tool –

  For the purpose of Data analysis Descriptive statistics (Frequency, percentage, average) and correlation analysis was used.

DATA ANALYSIS AND INTERPRETATION

Identified Distribution System –



Inference – As per the above representation there are four type of distribution system in which supplier was identified first and then further Distributors, Government Dairies and Private Dairies were identified through Snow-ball Sampling and their end-user who was acting as consumers were identified which shows a pattern of flow of milk from supplier to end-user. According to the above it clearly represent that there is two type of flows, first shows intermediaries i.e., distributors, Government Dairies, Private Dairies and second shows a direct flow of supplier to end user.

Section – I (Suppliers Interpretation)

1. Demographic Profile

TABLE – Demographic Profile of Suppliers

S.No.	Variable	Frequency		Percent	
1	Income				
	< 10,000	2		6.7	
	10,000 – 20,000	8		26.7	
	21,000 – 30,000	14		46.7	
	31,000 – 40,000	4		13.3	
	>50,000	2		6.7	
2	Gender				
	Male	28		93.3	
	Female	2		6.7	
3	Age				
	20 – 30	5		16.7	
	31 – 40	7		23.3	
	41 – 50	11		36.7	
	50 – 60	5		16.7	
	60 – 80	2		6.7	
4	Average Age	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
		20	77	44.20	12.518

Inference – The above table interprets the Demographic profile of suppliers in which there are few variables such as income, gender, age and average age. Mostly suppliers comes in the category of 21,000 to 30,000 i.e., 46.7%. Even gender ‘male’ was in majority i.e., of 93.3%. And Average age of the Supplier was 44 in which minimum was 20 and maximum was 77.

TABLE - Suppliers Dairy Milking Capacity

Variables	Minimum	Maximum	Mean	Std. Deviation
1. Average Milk production per day	5	300	103.00	78.889
2. Average Milk Sold per day	5	290	98.60	77.345
	Response	**Frequency**	**Percent**	
3. Milk Sold to	Household	13	43.3	
	Saras, Lotus and Payas	11	36.7	
	Both Households and Dairies	6	20.0	
4. Milk Production per day	1 – 100 litres	19	63.3	
	101 – 200 litres	8	26.7	
	201 -300 litres	3	10.0	
5. Milk Sold per day	1 – 100 litres	19	63.6	
	101 – 200 litres	9	30	
	201 -300 litres	2	6.7	
6. Cows Herd Size	1-10	24	85.7	
	11-20	3	10.7	
	21-30	1	3.6	
7. Buffalos Herd Size	1-10	18	66.7	
	11-20	8	29.6	
	21-30	1	3.7	

Inference – The above table shows the suppliers milking capacity. According to the results Average milk production was 103 and average milk sold was 98.60. According to the supplier milk sold to household, Saras, Lotus and Payas Dairies and Some are selling to both Households and other dairies. Majority of the suppliers were selling to the households (43.3%), 36.7 % were selling to the other Dairies and 20% was selling to both households and dairies. Milk produced and sold was mostly between 1-100 litres of milk i.e., 63.3% production per day and 63.6% sold per day. Cow Herd Size of Small dairy farms was mostly 1-10 i.e., 85.7% were having cows between 1-10 where as 29.6% were having 11-20 cows. If we see Buffalo herd size they were also mostly having 1-10 cows i.e., 66.7%, only 29.6 were having 11-20 cows in their farms.

2. Evaluation of hygiene practices –

TABLE – Supplier response regarding washing of udder before milking.

TABLE – Observation regarding cleaning of udder.

WASHING OF UDDER BEFORE MIKING			CLEANING OF MILKING ANIMAL UDDER		
Response	**Frequency**	**Percent**	**Responses**	**Frequency**	**Percent**
Yes	24	80	**Clean**	7	23.3
No	6	20	**Dirty**	23	76.7
Total	30	100	**Total**	30	100

Inference – As per the result mentioned above it clears that there was a huge difference between suppliers response and researchers observation regarding practice of washing of udder before milking. Out of 30 suppliers 24(80%) reported that they washed udder before milking where as the researcher observation was a bit different where it was found that only 7(23.3%) of them washed udder before milking.

TABLE – Percent of farms washing utensil with hot water

WASHING OF UTENSIL WITH HOT WATER		
Response	**Frequency**	**Percent**
Yes	2	6.7
No	28	93.3
Total	30	100

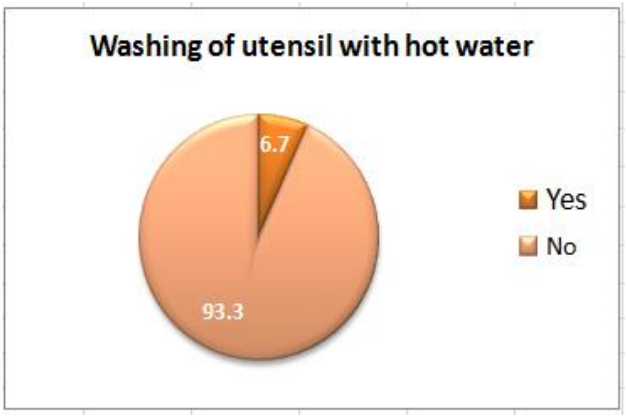


CHART – Percent of farms washing utensil with hot water.

Inference – As per the results only 6.7 % is washing their milking utensil with hot water.

TABLE – Hygiene practices followed by small dairy farms

S.No.	Variable	Response	Percent
1	Water used for cleaning utensil	Tap water	100
2	Milking utensil	Steel	13.3
		Aluminium	86.7
3	Availability of electricity	Yes	100
4	Cooling facility	No	100
5	Milking Frequency	Twice	100
6	Raw Milk supplying	Yes	100
7	Raw Milk consumption	No	100
8	Milking System	Hand	100
9	Transportation of milk	Motorcycle	43.3
		Cycle	3.3
		Jeep	53.3
10.	Cleaning of teat	Water	100

Inferences - Hygiene practices followed by small dairy farmers regarding water used for washing utensil was 100% by tap water and mostly used utensil for the milking was Steel(13.3) and Aluminium(86.7). Aluminium had shown higher percentage than steel container. There was 100% availability of electricity at small dairy farms. In concern to the cooling facility there was no such facility in small dairy farms available which can further cause multiplication of contaminated bacteria in milk as they were supplying only raw milk to different sources. There was only Hand milking system available at small dairy farms.

TABLE – Supplier Response regarding clean water.

TABLE – Observation regarding clean water

AVAILABILITY OF CLEAN WATER			PRESENCE OF CLEAN WATER		
Response	**Frequency**	**Percent**	**Response**	**Frequency**	**Percent**
Yes	18	60	**Yes**	4	13.3
No	12	40	**No**	26	86.7
Total	30	100	**Total**	30	100

Inferences – As per the result 60% (18) were having availability of clean water but according to the researcher observation only 13.3% (4) were having presence of clean water.

TABLE – Supplier response regarding frequency of barn cleaning

TABLE – Observation regarding cleaning utensil

FREQUENCY OF BARN CLEANING			CLEANED UTENSIL		
Response	**Frequency**	**Percent**	**Response**	**Frequency**	**Percent**
Twice	30	100	Yes	11	36.7
			No	19	63.3

Inferences – As shown in the result barn cleaning was done twice a day by every small dairy farmers but as per observation results only 11(36.7) of them were having cleaned utensils.

TABLE – Supplier response regarding teat dipping practice

TABLE – observation regarding cleaned teats

PRACTICE OF TEAT DIPPING			CLEANED TEAT		
Response	**Frequency**	**Percent**	**Response**	**Frequency**	**Percent**
Yes	2	6.7	**Clean**	3	10
No	28	93.3	**Dirty**	27	90

Inference [Table] – According to the above table only 2(6.7%) out of 30 are practicing teat dipping and it is clearly shown in observation table that only 10%(3) are having cleaned teat.

TABLE – Results of observation of hygiene practices of suppliers.

S.No.	Variable	Response	Percent
1	Milking area cleaning:		
	Floor	Cleaned	3.3
		Not cleaned	96.7
	Urine	Present	53.3
		Not present	46.7
	Manure	Present	63.3
		Not present	36.7
	Uterine discharge	Not Present	100
	Dirt	Present	96.7
		Not present	3.3
	Hairs	Present	96.7
		Not present	3.3
2	Milking Animal cleaning:		
	Body	Clean	60
		Dirty	40
3	Proper feeding	Yes	80
		No	20
4	Proper transport for distribution	Yes	83.3
		No	16.7
5	Proper shed for animals	Yes	96.7
		No	3.3
6	Proper ventilation for animals	Yes	100
7	Milking of animals Done at	Inside the roof	100

Inference – As per the table there were few variables identified which tells about the cleaning of milking area like floor which was cleaned by 3.3% out of 100%, urine was present by 53.3%, manure was present by 63.3%, there were no presence of uterine discharge in any of the farms, dirt and hairs both were present by 96.7%. Overall milking area was not cleaned. As concern to milking animals 60% of animal's body was cleaned. Proper Feeding of animals was about 80%

3. Awareness of suppliers Regarding Zoonoses and Milk-borne diseases–

TABLE – Awareness of Disease transmission through Cows to Humans

Response	Frequency
YES	4(only allergy)
NO	26

Inference – The above table shows the awareness of diseases transmitted from cows to humans which shows that only 4 were aware but only about some symptoms not about the diseases.

TABLE- Awareness of Disease Transmission by Drinking Milk

Response	Frequency
Diarrhoea	9
Fever	6
TB	1
Jaundice	2
Not Aware	16

Inference – As per the results few responses were identified regarding their awareness of disease transmission by drinking milk like Diarrhoea which was known mostly to supplier i.e., about 9 supplier. But if we look at non – awareness among the supplier there were 16 suppliers who were not known about any disease.

TABLE - Awareness of Mastitis

Response	Frequency
YES	17
NO	13

Inference – Above Results Shows the response against the awareness of mastitis which was very well known by 17 supplier with its local name i.e., Thanala.

TABLE - Responses Regarding Symptoms during Mastitis

Response	Frequency
Swelling in udder	11
Bleeding	6
Infection in teat	4
Rashes in teat	2
Cuts in teat	3
Don't Know	12

Inference – As per the above table there were many responses regarding Symptoms during mastitis. About 11 suppliers were known about swelling in udder can cause mastitis in cattle's, bleeding in cattle's were know by 6 supplier, infection in teat were known by 4 supplier, rashes in teat known by 2 suppliers and 12 of them were not known about any Symptoms during mastitis.

Section – II (Distributors Interpretation)

TABLE – Evaluation Hygiene practices of distributors

S.No.	Variable	Response	Percent
1	Transportation used for distribution	Motorcycle	60
		Jeep	40
2	Milk distribution	Households	80
		Milking factories	20
3	Cooling procedure	No	100
4	Utensil used for distribution	Steel	60
		Aluminium	40
5	Pouring of milk through	Tap	10
		Top of utensil	70
		Do not Serve to Households	20
6	Cleaning of pouring utensil every time before serving milk	No	80
		Do not Serve to Households	20

Inferences – This Tables shows some variables related to hygiene practices of distributors while transportation of the raw milk. Firstly it shows the transportation mode they are using for the milk supply which shows that they motorcycle (60%) was mostly used. And they supply 80% raw milk to households without any cooling system. Distributors use 60% Steel containers for supplying in which only 10% were having tap system otherwise they serve milk by top of the utensil (70%). Even they do not wash their pouring utensil every time while they serve.

Section – III (Consumers Interpretation)

1. **Demographic Profile –**

TABLE – Demographic Profile of Consumers

S.No.	Variable	Frequency		Percent	
1.	Gender				
	Male	26		65.0	
	Female	14		35.0	
2.	Income				
	10,000 - 20,000	3		11.5	
	21,000 - 30,000	6		23.1	
	31,000 - 40,000	11		42.3	
	41,000 - 50,000	6		23.1	
3.	Age				
	<30	20		50.0	
	31-45	13		32.5	
	>45	7		17.5	
4.	Average Age	Maximum	Minimum	Mean	Std. Deviation
		17	67	33.85	14.38
5.	Litre per day	1	3.5	1.96	.683

Inference – Above Table represents the demographic profile of consumers which shows that mostly male (65%) where asked questions regarding hygiene. And their income comes in between 31,000 to 40,000 (42.3%). 50% were of age <30 and average age was 33.85 and average litre of milk they took was approximately 2 litres.

2. **Evaluation of hygiene practices –**

TABLE – Consumer responses on Hygiene practices

S.No.	Variable	Response	Percent
1	Consumption of raw milk	No	100
2	Storage of milk	Refrigerator	70
		Room temperature	30
3	Curdling of milk	Sometimes	40
		Frequently	7.5
		Never	52.5
4	Feeling of diarrhoea after drinking of milk	Yes	17.5
		No	82.5
5	Milk consumption from other source	Yes	22.5
		No	77.5

Inference [Table] – As per the Results there are 100% consumers who are drinking boiled milk. 70% of the consumers were storing milk at refrigerator and 40% of them had faced curdling of milk sometimes and 52.5% had never faced any curdling of milk. Only 17.5 % of consumers feel diarrhoea after drinking milk and 22.5% are consuming milk from other sources.

3. **Awareness Regarding Zoonoses and Milk-borne diseases–**

TABLE - Awareness Regarding Diseases Spread by Drinking Raw Milk

Response	Frequency
Stomach infection	3
Diarrhoea	8
Fever	4
Allergies	4
Don't know	21

Inference – This Tables Depicts the awareness of consumers regarding Diseases spread from Drinking Raw Milk. Mostly consumers knew about Diarrhoea (8) and 21 consumers were do not know about any diseases.

Section – IV (Results of Milk Testing for Mastitis)

TABLE – Average pH and Temperature of Cattle's

Mean of pH and Temperature of Cattle's					
	N	Minimum	Maximum	Mean	Std. Deviation
pH of cows	30	4.00	8.00	6.10	.844
Temperature of cows		91.20	100.20	93.35	2.078
pH of buffalos	28	4.00	7.00	5.85	.705
Temperature of buffalos		92.70	98.60	95.07	1.036

Inferences – Mean pH of cows and buffalo was 6.10 and 5.85. Mean Temperature of cows and buffalos was 93.35 and 95.07.

TABLE – Results showing pH of cows

pH of cows	Frequency	Percent
4.0	2	6.7
6.0	24	80
7.0	1	3.3
8.0	3	10

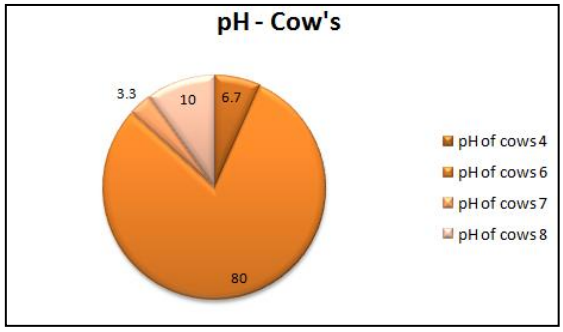


CHART - Results showing pH of cows

Inference – As per the above table it can be seen that 80% of the cows were of '6' pH and about 6 cows has shown low and high pH which interprets the bad hygiene.

TABLE – Results showing pH of Buffalos

pH of Buffalos	Frequency	Percent
4	3	10.7
6	23	82.1
7	2	7.1

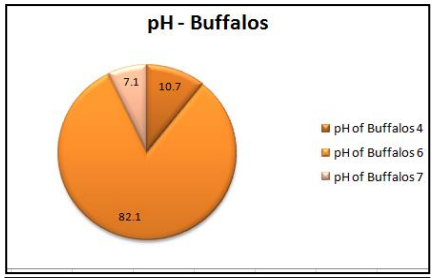


CHART - Results showing pH of buffalos

Inference – Table showing the pH of Buffalos in which 82.1 % of buffalos are showing 6 pH and rest 5 are showing high and low pH.

TABLE – Result showing temperature of cows

Temperature	Frequency	Percent
90 -95	25	83.3
95.1 -100	4	13.3
>100	1	3.3

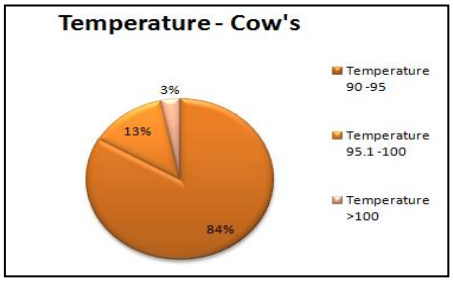


CHART - Result showing temperature of cows

Inference – As results shows the majority of cows had temperature 90-95 which can be a sign of bad hygiene. Others are showing very high temperature (95.1-100 and >100) which shows high bacterial growth in milk.

TABLE – Results showing temperature of buffalos

Temperature	Frequency	Percent
90 -95	14	46.7
95.1 -100	14	46.7
>100	2	6.7

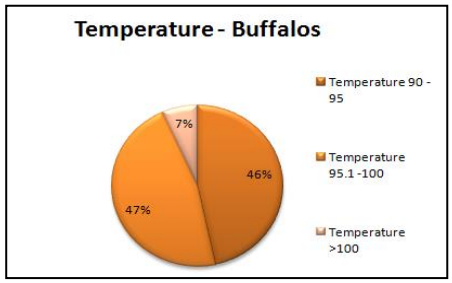


CHART - Results showing temperature of buffalos

Inference – As results shows that temperature of buffalos was mostly in between 90 to 100 Fahrenheit which leads to bad hygiene of milk.

TABLE – Showing Co-relation between pH and temperature of cows

		pH of cows	Temperature of cows
pH of cows	Pearson Correlation	1	.580**
	Sig. (2-tailed)		.001
	N	30	30
Temperature of cows	Pearson Correlation	.580**	1
	Sig. (2-tailed)	.001	
	N	30	30
**. Correlation is significant at the 0.01 level (2-tailed).			

Inference – As per the results there is a Strong correlation between pH and temperature of cows i.e., of .580 which signifies a strong relation between both.

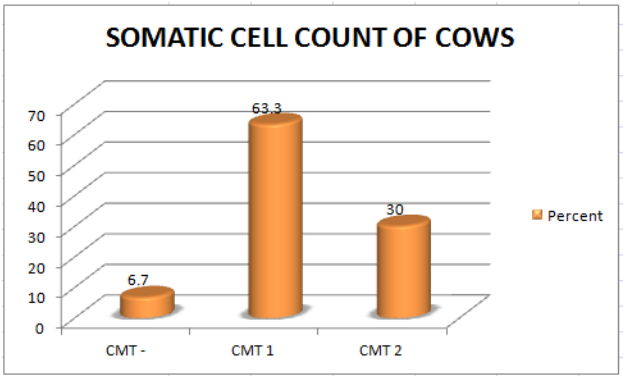
TABLE – Showing Co-relation between pH and temperature of buffalos

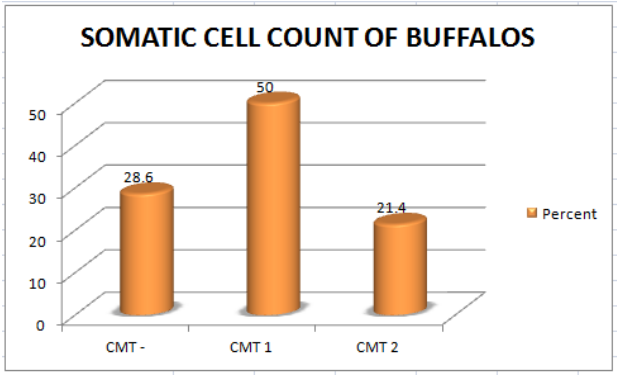
		pH of buffalos	Temperature of buffalos
pH of buffalos	Pearson Correlation	1	-.168
	Sig. (2-tailed)		.393
	N	28	28
Temperature of buffalos	Pearson Correlation	-.168	1
	Sig. (2-tailed)	.393	
	N	28	28

Inference – As per the result there is a weak correlation between pH and temperature of buffalos i.e., of .168 which signifies a weak correlation between both.

TABLE – Showing Somatic Cell count of Cow's and Buffalos

	SOMATIC CELL COUNT OF COWS		SOMATIC CELL COUNT OF BUFFALOS	
	Frequency	Percent	Frequency	Percent
CMT -	2	6.7	8	28.6
CMT 1	19	63.3	14	50
CMT 2	9	30	6	21.4





GRAPH – Showing percent of cows with Somatic cell count

GRAPH – Showing percent of buffalos with Somatic cell count

Inference – Above results shows the Somatic cell Count of cows and buffalos which depict the presence of mastitis by California mastitis test. According to the result 63.3% are showing CMT 1 in cows which means they are having risk of mastitis and somatic cell count was 500,000 – 10,00,000 and 30% of showing CMT 2 in cows which Shows a high risk of mastitis and it can be a mastitis and somatic cell count was 1,000,000 – 5,000,000. In buffalos 50% are showing the CMT 1 which depicts the risk of mastitis with 500,000 – 10,00,000 and 21.4% are showing CMT 2 which shows a high risk of mastitis with somatic cell count of 1,000,000 – 5,000,000.

CONCLUSION –

1. According to the first objective Distribution system of small dairy farms was of four types in which supplier is the main person to supply raw milk to three different areas i.e., to households, private dairies and government dairies.
2. Second objective showed the hygiene practices under three categories:-
    a. Suppliers –
        - It was found that every supplier was selling raw milk directly to households without any cooling facility.
        - In the results both suppliers response and observation were taken and shows many variation in few variables like washing of udder, availability of clean water, cleaning of utensils etc.
        - Observation shows few unhygienic conditions like milking area was cleaned by only 3.3% and mostly (53.3%) were having presence of urine in milking area. Body of animal was clean by 60%of small dairy farms.
        - Awareness regarding disease spread through cows to humans was not known by 26 out of 30 suppliers.
    b. Distributors -
        - Few practices by distributors can cause bacterial growth like no cooling facility available while distribution, only 10% were using tap utensil and 70% were pouring milk from the top of the utensil without any wash.
    c. Consumers –
        - A response of consumers regarding the curdling of milk sometimes was 40% and about 18% were feeling diarrhoea after drinking milk.
        - Awareness regarding zoonoses or milk – borne diseases were not known by 21 and others responses were the symptoms not about the diseases.
3. pH, Temperature and CMT(Milk test for mastitis) –
        - pH – which shows that there were 6cows who was having low and high pH than 6 and similarly in buffalos it was showing that 5 in number whose pH is either High or low. Even it signifies that cows shows more prevalent towards bacterial growth.

- Temperature – Cows temperature was mostly in between 90 to 95 Fahrenheit but in buffalos it shows in between 90 – 100 which in comparison to was more.
- Correlation – The pH and temperature of cows shows a very strong correlation of 0.580. But pH and Temperature of buffalos show opposite results i.e., a weak correlation of -.168.
- California Mastitis Test in cows and buffalos was showing risk of mastitis in both cows and buffalos because they are mostly come in category of CMT1 and 2. But as per the results it shows that in cows were having more risk than buffalos and this whole results can depict that hygiene practices are not been followed under small dairy farms.

LIMITATIONS –

1. Less number response from dairies due to fear.
2. Funding of the project was les due to which survey done was limited.

SCOPE –

1. Study was done only in Peri –urban area.
2. Sample collection was only on small dairy farms.

RECOMMENDATIONS –

1. Awareness programs for zoonoses occurrence in raw milk of small dairy farms to:-
    - Dairy farm owners
    - Young generation who belongs to dairy family
    - Consumers – households.
    - Distributors (Awareness while transporting milk)

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APPENDIX –

Interview Schedule for milk supplier

General information

Name –

Address –

Gender –

Age –

Income –

Less than 10,000	10,000 – 20,000	20,000 – 30,000	30,000 – 40,000	40,000 – 50,000	More than 50,000

Milk –

Milk produced yesterday	Milk sold yesterday	Milk price yesterday

Selling -

	Milk distributor	Households	Other.....
To how many do you sell			
How much milk you distribute (litres)			

How many farms they have –

How many milking cows you have –

How many buffalos you have –

Any other milk product you produced:-

- Milk
- Butter

- Paneer
- Ghee
- Curd
- Butter milk

Can you mention a disease that can transmit from a cow to a human .....

Can you mention a disease that you can get from drinking milk .....

Have you heard about brucellosis or mastitis? .....

If yes then can you describe it what it is.....

Have you ever seen any swelling in mammary glands of your cows .....

Utilization of artificial insemination or natural reproduction:

Natural service	Articifial insemination

Note: - 0= never, 1 =sometimes, 2 = always

Handling practices questions

Do you wash udder before milking

a. Yes
b. No

Do you wash hand after milking

a. Yes
b. No

Do you wash milking utensils with hot water

a. Yes
b. No

What source of water used for cleaning milk utensils?

a. Tap water
b. well water
c. River water

Milk utensils used for milking

a. Plastic jar
b. Nickel
c. Steel
d. Aluminium

Milk utensils used for storage

a. Aluminium jar
b. Plastic jar

Clean water available in farm

a. Yes
b. No

Electricity in farm

a. Yes
b. No

Is there any cooling facility

a. No, cooling available, store at room temperature
b. Refrigerator
c. Traditional system

What is the frequency of milking?

a. Once a day
b. Twice a day
c. Other.....

Do you have habit of supplying raw milk?

a. Yes
b. No

Do you have habit of consuming raw milk?

a. Yes
b. No

What is the milking system?

a. Hand
b. Machine

How long do you store milk before you sell it, at maximum?

.....

What kind of transport is used to distribute the milk?

a. Motor cycle
b. Cycle
c. Jeep
d. Tempo
e. Other.....

Hand washing questions

	No wash	Tap water	Well water	Hot water	Use detergent
Before milking					
Between milking cows					
After milking					

Cleaning of teats by

a. Water
b. Detergent

Frequency of barn cleaning

a. Not every day
b. Once
c. Twice
d. more than twice per day

Do you practice teat dipping?

a. Yes
b. No

Interview schedule for intermediaries

Name –

Address –

Gender –

Age –

Income –

How much milk you distribute per day –

Whom you distribute milk –

How many consumers you are allotted with –

Handling practices questions

What kind of transport is used to distribute the milk?

a. Motor cycle
b. Cycle
c. Jeep
d. Tempo
e. Other.....

Who are the consumers or intermediates to whom milk is distributed?

a. Households
b. Other suppliers
c. Milking factories
d. Other.....

Any cooling procedure used to transport milk

a. Yes
b. No

Hand washing questions

Which utensil is used for transportation of milk

a. Steel container
b. Aluminium container
c. Others.....

Milk is poured out by

a. Tap
b. Top of utensil

What is used to measure milk.....

Is that measuring utensil is cleaned every time it is used

a. Yes
b. no

Interview schedule for end-user

Name –

Address –

Gender –

Age –

Income –

Profession –

How much litre of milk taken per day –

Do you know what kind of diseases occurred through milk.....

Basic hygiene questions -

Do you use milk sold by__ person

a. Yes
b. No

Do you use raw milk?

a. Yes
b. No

Where you store milk

a. Refrigerator
b. Room temperature
c. Other

Is that milk good in taste?

a. Yes
b. No

Is curdling of milk happens

a. Sometimes
b. Frequently
c. Never
d. Other

Did you feel diarrhoea after drinking milk?

a. Yes
b. No

Do you consume milk from other source?

a. Yes
b. No

If yes then from where .....

Results of clinical test of milk

Temperature -

pH -

Somatic cell count (keno test) –

CHECKLIST

- Milking area is clean :-
  - a. Floor — Cleaned / Not cleaned
  - b. Urine — Present / Not present
  - c. Manure — Present / Not present
  - d. Uterine discharge — Present / Not present
  - e. Dirt — Present / Not present
  - f. Hairs — Present / Not present
- Milking animals are clean
  - a. Teat — Clean / Dirty
  - b. Body — Clean / Dirty
  - c. Udder — Clean / Dirty
- Presence of clean water — Yes / No
- Utensil are clean — Yes / No

- Feeding is done completely | Yes | No
- Proper transport vehicle | Yes | No
- Presence of shed to the animals | Yes | No
- Proper ventilation inside the farm | Yes | No
- Milking of cows done | Outside the roof | Inside the roof