DISSERTATION

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Knowledge and practices about hygienic milk production among dairy farm workers, south west Delhi.

BY

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UNDER THE GUIDANCE OF

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Sincerely,
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TABLE OF CONTENTS

LIST OF TABLES

List of Appendices

CHAPTER ONE

1.1BACKGROUND OF STUDY

India has emerged as the highest milk producing country in the world with an annual production of 137.7 million tones (2013-14) (1) .Milk is the basic protein source in almost all homes and is catered by both packaged and non-packaged business products. The quality of contaminated milk deteriorates quickly and produces diseases if consumed. Therefore care has to be taken in production, storage and transport of milk. Knowledge about hygienic milk production practices is essential for proper health and nutrition. Dairy farming is a growing profession in peri urban areas of Delhi, with large number of unorganized dairy farmers. However, an assessment of their knowledge of hygienic milk production practices has not been carried out in a systematic manner. .This study aims at assessing the knowledge and practices of hygiene milk production among small dairy farmers in Peri urban area of south west Delhi. The desired outcome indicates knowledge level of dairy farm workers regarding hygiene milk production practices. This exploratory cross sectional study is conducted among 60 dairy farm workers, selected conveniently from South West Delhi. Practices and knowledge levels is assessed using a pretested semi-structured questionnaire.

1.2 INTRODUCTION

Clean milk can be defined as milk produced from healthy milch animal possessing normal flavor, devoid of dirt and filth containing permissible limit of bacteria and essentially free from adulterants, pathogens, various toxins, abnormal residues, pollutants and metabolites (2). Contaminated milk deteriorates quickly and is a cause for health concerns. Therefore extreme care has to be taken in production, storage and transport of milk**.** Transmission of certain diseases through food remains an important cause of illness in both developing and developed countries. Zoonosis is diseases and infections that are naturally transmitted between vertebrate animals and humans. Zoonosis constitutes 61% of all known infectious diseases. It may also be noted that out of the 175 diseases considered to be emerging, 75% are zoonotic.(1)Poor hygiene, poverty, malnutrition, lack of education and close contact with animals is predisposing factors for zoonotic diseases. There are some 45 zoonotic diseases purported to be transmitted from cattle. Dairy farmers who are in close contact with their animals are always at risk of acquiring infections from animals, especially since most of these diseases are prevalent in animals in our country. Maintenance of healthy milking animals has been shown to reduce the likelihood that

human pathogens will be introduced into the milk via the mammary gland or from the feces .The transmission of some zoonotic diseases can thus, be minimized by adopting hygiene milk practice.(3)

Some of the zoonotic diseases of cattle that spread through milk are Brucellosis, Tuberculosis, Salmonellosis, Vesicular Stomatitis etc. Prevention of vesicular stomatitis is by wearing gloves while handling animals suspected of having vesicular stomatitis. Hands should be thoroughly washed after handling any animals. Prevention of tuberculosis is by avoiding unpasteurized dairy products. People acquire salmonella from undercooked contaminated meat, infected eggs, or unpasteurized milk products. If hands are not washed after direct contact with infected feces, then accidental ingestion of bacteria can also occur.(4)

The Clean milk production involves thorough cleanliness at all phases of handling and stringent quality control and hygienic measures have to be adopted at farm level. The milk quality is determined by aspects of composition and hygiene of milk.(2)

Clean milk production helps in preventing spoilage of milk within short span .Increase the quality and shelf life of milk and milk products and it also helps in controlling the spread of infectious diseases like Tuberculosis and Diphtheria etc.

There are mainly four factors to be considered in

Clean Milk Production (CMP) practices-

Animal hygiene, milking hygiene, equipment hygiene and processing hygiene.(5)

MILKING HYGIENE

Milking hygiene covers management of personal hygiene of the milk man and milking process. Milking should be carried out in such a manner that minimizes contamination of the milk being produced. Effective hygienic practice during milking is an important element of the system of controls necessary to produce safe and suitable milk and milk products. Failure to maintain adequate sanitation and employee practices has been shown to contribute to the contamination of milk with undesirable or pathogenic microorganisms or chemical or physical hazards.(3)

Absolute cleanliness of personnel is required specifically - Milking should be carried out under good personal hygiene of the milker.Milker should wear clean clothes while milking. Milker should not be suffering from any respiratory ailment or contagious disease. He/she should avoid any contact with the cattle .Milker should not have any open sores or cuts.

ANIMAL HYGIENE

The animals should be maintained in hygienic environment for production of quality milk.

- Areas and premises

  The cattle shed or barn should be adequately lighted and ventilated. Facilities should be provided for safe and potable water for drinking, washing udders and flanks of the animals and for washing milker's hands. Cattle shed should be adequately lighted and ventilated. Remove accumulated cow dung.

- Animal health-

  The milk should be drawn only from healthy cattle free from diseases that make the milk unfit for human consumption. Animals suffering from contagious diseases including mastitis should be segregated from healthy ones.

- Feeding-

  With consideration given to the end use of the milk, forage and feed for lactating animals should not introduce, directly or indirectly, contaminants into milk in amounts that present an unacceptable health risk to the consumer or adversely affect the suitability of milk or milk products

- Veterinary drugs-

  Animals should only be treated with veterinary drugs authorized by the competent authority for the specific use and in a manner that will not adversely impact on the safety and suitability of the milk, including adherence to the withdrawal period specified.

EQUIPMENT HYGIENE

Milking equipment should be designed, constructed, installed, maintained and used in a manner that avoids the introduction of contaminants into milk.
Milking equipment should be operated in a manner that avoids damage to udder and teats and that will avoid the transfer of disease between animals through the milking equipment.(6)
Milking can be rinsed with cold water. Scrubbing is done with warm water or brush. Sanitize can with boiling water or steam if available or use dairy sanitizing solution such as hypochlorite or commercial brand preparations. Dry cans on a drying rack. Exposure to sunlight will enhance killing off bacteria during drip drying of cans.(7)

Milking vessels must have smooth milk contact surfaces with minimal joints and crevices. Rubber components of milking machines should be renewed at regular intervals. Water for dairy use must be clean. Detergents used for cleaning dairy equipment should not contaminate the milk.

PROCESSING HYGIENE

This includes management practices during collection and transportation of milk. Milk at the time of milking is at body temperature. Preserving the milk at that temperature causes deterioration quickly. As such the milk should be chilled and stored. Chilling of milk enhances the storage time without spoiling. While transporting milk to the dairies also the cold chain should be maintained for preventing deterioration. After pasteurization the milk has to be cooled to a temperature below 50C by using refrigerators / water coolers preferably within 2 hours after milking. The milk can be cooled by immersing the cans of milk in clean, running water .Milk should be carried in SS utensils/ SS Cans.(8)

1.3 OBJECTIVE

To assess knowledge and practices of dairy farmers regarding hygienic milk production practices at dairy farm level.

1.4 SECONDARY OBJECTIVES

- To assess the knowledge level of dairy farmers in producing clean milk and milk products.
- What are present practices conducted about hygienic milk production among dairy farmers?
- To explore factors associated with knowledge regarding hygienic milk production among dairy farmers.

1.5 RESEACH QUESTIONS

1. Whether small scale dairy farmers in peri urban area have appropriate knowledge of hygienic milk production practices?
2. Is there any association between different factors like socio economic statuses, age, and experience with knowledge level of farmers?

1.6 SCOPE AND LIMITATIONS OF STUDY

- The study provides information on knowledge and practices of dairy farm workers regarding hygiene milk practices, south west Delhi.
- Result of the study cannot be generalized to a larger population. It gives us indication of present knowledge and practices of farm workers. Study can be conducted across different geographical locations to get a wider understanding.

- There could be some degree of bias on the part of farm workers in answering some hygiene questions.
- Influence of religion, cast and ethnicity is not considered in the study. Their behavior can also be affected by these factors.

1.7 RESPONSE RATE

In data collection, Unit non-response takes place when a randomly sampled individual cannot be contacted or refuses to participate in a survey. To get the sample size of 60 farm workers around 65 farm workers were targeted .Out of that 5 were not available or refuse to answer and left the study in the midway. Their response is not considered in the study .Other 60 main participants showed interest in the study and agreed to participate with their consent. Response of the study is 92.3%.

CHAPTER TWO

LITERATURE REVIEW

2.1 Review of Literature

Knowledge of hygienic milking practices varies across India. However, there are few documented evidences in this regards. Many of the gaps noted in published literature is from other developed nations and other continents.

Zoonotic diseases are spread in variety of ways. In case of Brucellosis, most infections in humans are associated with drinking or eating unpasteurized milk products. Transmission among cattle is through ingestion of birthing fluids and milk and in utero. Human brucellosis is prevented by not drinking unpasteurized dairy products, and wearing gloves when handling reproductive tissues. Hands should be washed after touching or handling animals.(4)

Milk yield can be improved by adopting various improved farming techniques. In a case study on milk yield at kisan dairy , Haryana showed how good farm techniques like good quality feeding, periodic checkups by a veterinarian, efficient disposal of cow dungs to maintain hygienic environment helps in increasing milk yields. Milk yield at Kisan Dairy farm is several times higher than the national Indian average. It is focused at maintaining healthy environment for cattle as Healthy; long-lived cows save on the cost of replacement and expensive veterinary treatments and guarantee a stable milk supply.(9)

A study conducted by Welearegay H et al in Southern Ethiopia suggests unhygienic conditions of milking, unclean equipment for milk handling and the use of contaminated water are among the important sources of milk contamination(10)

Improving sanitation by adopting clean milk production practices can reduce the bacteriological count to a significant level. A study was carried out in Indonesia to test the effect of improving sanitation prior to milking on milk quality of dairy cow in farmer group. The study reveals that improving sanitation significantly decreased milk acidity from 0.19% to 0.14% and number of bacteria in milk.(11).Thus by managing simple farm practices like shed cleaning, udder washing cleanness of floor in the stable, water and feed trough, and pre- milking preparation (cleaning and drying udder, discard first milk flow can help to decrease bacteriological count in milk.

Knowledge of Dairy farm workers regarding different milk hygiene practices is fairly low in different part of India. Analysis of the Clean Milk Production Practices (CMP) was done on

Dairy Farmers of Kerala. The study revealed that more than half of the respondents (77%) had medium knowledge of CMP practices and the rest were in the low category (23%). None were in the high category for knowledge of CMP practices.(5).Clean milk production improves economic benefit for producer and is also important for health of consumer. (5)

A similar study was conducted in the state of Rajasthan to know the level of knowledge and adoption of dairy farmers regarding clean milk production practices. The results of the study revealed that 55.84 per cent of the dairy farmers had medium level of knowledge in various aspects of CMP, followed by 33 and 20 per cents of them having low and high level of knowledge, respectively.(2)

Other cultural, socio economic, personal factors can have an influence on knowledge and adoption of hygiene practices. According to one study factors like the education, experience in dairy farming, herd size, annual income, knowledge regarding clean milk production practices had positive and highly significant correlation with adoption of clean milk production practices.(12)

Milk yield can be improved by adopting various improved farming techniques. In a case study on milk yield at kisan dairy , Haryana showed how good farm techniques like good quality feeding, periodic checkups by a veterinarian, efficient disposal of cow dungs to maintain hygienic environment helps in increasing milk yields. Milk yield at Kisan Dairy farm is several times higher than the national Indian average. It is focused at maintaining healthy environment for cattle as Healthy; long-lived cows save on the cost of replacement and expensive veterinary treatments and guarantee a stable milk supply.

Lack of information could result in public health risks and economic losses affecting the livelihoods of smallholder dairy producers. Hence, an understanding of farmers' practices and knowledge on milking hygiene and milk-borne zoonosis is very important to reduce risk of cattle and milk-borne zoonosis transmission to humans. The aim of this study is to assess the knowledge and practices of dairy farm workers regarding hygienic milk production practices in, peri urban area.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This section is divided into different sections covering, the research site; research design; study population; methods of data collection; analysis and ethical consideration.

3.2 STUDY SETTING

The present study was conducted in Najafgarh tehsil, a typical peri-urban area in south west Delhi with concentrated dairy farming villages. Nangli dairy in Najafgarh has many milk producing dairy farms and households. Hindi is the local language here. These facilities are chosen on the basis of their suitability to the purpose of the study.

South West Delhi is one of the eleven administrative districts of the National Capital Territory of Delhi in India. The Sub city of Dwarka serves as the administrative headquarters of South West Delhi. The District is composed of three Sub-Divisions; Vasant Vihar, Najafgarh and Delhi Cantonment. The south west Delhi is comprised of urban and peri urban areas with a population of 2292363(census2011), literacy rate 88.81%, population density 5445, area 421 sq km.

STUDY POPULATION -Dairy farm workers, who were directly involved in milking and handling milk and milk products. Dairy farm workers are first point of contact of milk production, their knowledge is essential for hygienic production of milk. Adults above the age of 18 years were chosen for the study[1].

3.3 STUDY DESIGN

Descriptive cross sectional study

3.4 SAMPLING and SAMPLE SIZE

Convenient sampling was used to select the respondents under this study.

[1] As per Indian law definition-A legal adult is a person who has attained the age of majority (on completion of 18 years) and is therefore regarded as independent, self-sufficient, and responsible

SAMPLE SIZE- Sample size consisted of 60 adult dairy farm workers. Sample was chosen based on convenience and accessibility.

30 dairy farms were selected for the study. Researcher visited 30 dairy farms in najafgarh district. From each farm, maximum of three dairy farm workers were chosen who were mainly involved in milking and handling of cattle. He/she was asked questions from a pre-tested and piloted semi -structured questionnaire. The information on hygienic practices was extracted from these answers, tabulated and analyzed and presented in the report in a tabular format or charts as the case be.

3.5 DATA COLLECTION TOOL

Data was collected with the help of a questionnaire. The questionnaire was comprised of various sections with questions related to: animal hygiene, milking hygiene, equipment hygiene and processing hygiene (annexure1). Socio-economic status was assessed using modified Kuppuswamy scale.

The sections and questions were selected with close consultation with subject matter experts and from available review of literature covering the basic points of clean milk production practices as detailed in standard operating procedures by National Dairy Development Board (NDDB).

The semi-structured questionnaire was developed initially in English and translated into Hindi and re-translated back to ensure meaningful context and reliability.

The items for this test were selected with the consultation of subject matter specialists, reviewing literature and previous research studies. Some were based on guidelines and SOP for clean milk production practices (given by NATIONAL DAIRY DEVELOPMENT BOARD).

3.6 ETHICAL CONSIDERATION

An informed consent was taken from farmworkers prior to study and participants have been informed about the purpose of the study.

Participation for the study was completely on voluntary basis. There was no pressure either from the enumerator or the Institute (IIHMR, Delhi). The participants could refuse to participate or continue the interview at any time and leave the interview.

Confidentiality of Information: Assurance was provided to farm workers that the information shared would be kept strictly confidential. The information shared was used only the evaluation

purpose and was not discussed with anyone not involved in the project. Respondents ID number was not revealed to anyone outside the study team. It was collected by the research fellow only.

3.7 ANALYSIS OF DATA

The data collected was entered in a database specifically created for this purpose using MS Excel (version 2013/16). Further analysis was done with IBM SPSS Statistics (cross tabulation).

Presentation of data was done using tables and charts as appropriate Pilot.

3.8 PILOT STUDY

Pilot study was conducted to check the credibility of questionnaire. The questions which were difficult to understand, ambiguous are modified. A pilot was conducted to ensure the reliability and validity of the questionnaire.

CHAPTER FOUR

RESULTS

The Nangla dairy farms are located in Najafgarh, Peri urban area in South west district. In 1978, when development of important areas in Delhi started, all dairies were shifted to the outskirts of the city. Since then not much development work has happened in this area, which lacks even the basic civic amenities. Situated few km away from posh area of Dwarka, people here are struggling with basic electricity and water.55.6% of dairy farm workers reported unavailability of clean water. Dairy Farming is a major profession there. Milking is carried out by hands with a little use of machine and other milking equipment. The study reported 100% milking practice by hands.

TABLE-4.1

Profile of dairy farm workers

S.NO	PARTICULARS	RANGE	FREQUENCY	PERCENTAGE
1	Age	• Adults(18-35) • Middle age adults(36-55) • Older adults(55 and above)	29 20 4	54.7% 37.7% 7.5%
2	Education of the head of the family	Unemployed Skilled worker clerical, shopkeeper, farmer	2 4 54	3.3% 6.7% 90%
3	Experience	1-10 20-30 30-40 40-50	22 21 12 2	38.6% 36.8% 21.1% 3.5%
4	Socio – economic status	LM UL Um	17 26 17	27.9% 42.6% 27.9%
5	Daily average milk production(kg/day)	Less than 150 More than 150	42 15	72.2% 27.7%
6	Lactating	Less than 30	42	72.2%

	cattle number	More than 30	15	27.7%

PROFILE OF DAIRY FARMER

Most of the dairy farm workers are adults with 54.7% belong to the age group 18-35. This is probably because farming activity requires vigorous manual work. Dairy Farm workers reported a mean of 16 years of dairy farming experience, with a minimum of 2 year and a maximum of 40 years of experience. Around 42.2% of dairy farm workers belong to Upper lower socio economic group according to the scale developed by Kuppuswamy. 72.2% of dairy farms under study possess lactating cattle less than 30 while 22.7% possess more than 30.Average milk production is 135 kg/day while 72.2% farms produce less than 150 kg/day milk.

Scoring

Here we are testing basic knowledge and practices of workers regarding clean milk production. To quantify the response for every correct or ideal answer participant is given mark 1. For every wrong response zero is given example:-

Parameter	RESPONSE	Scoring
Isolation of healthy cattle from diseased ones	YES (Expected) NO (Not Expected)	1 0

Multiple choice questions having more than one correct answer are marked according to the degree of correctness .E.g.:

Parameter	RESPONSE	Scoring
Solution used for cleaning utensils	No use Only Water Soap and detergent	0 1 2

Responses for each knowledge and practice questions are then added to find total knowledge and practice score respectively.

TABLE-4.2

Knowledge of farm workers regarding following hygienic milk production practices:

S.no	Parameter	Frequency	Percentage of workers following ideal practice
1	Pasteurization of milk before consuming Pasteurized (1)	38	63.3%
2	Importance of hand washing Yes (1)	46	76.6%
3	Wash hands before milking Yes (1)	45	73.7%
4	Wash hands after milking Yes (1)	42	70%
5	Usage of soap Yes (1)	36	60%
6	Usage of towel Yes (1)	35%	57.4%
7	Importance of clean clothes Yes (1)	19	31.7%
8	Tobacco use prevention Yes(1)	31	47.5%
9	Proper disposal of dung Drain (1) Used (1) Man picks away (1)	 26 15 7	 41.6% 24.6% 11.5%
10	Cleaning of farm area Once or twice Three or four times	 36 24	 60% 40%

Knowledge regarding various clean production practices.

1. **Pasteurization of milk** –Pasteurization of milk is important practice to remove harmful microorganisms from milk. 63.3% of workers reported that it is essential to pasteurize milk before consuming, which is a healthy practice while 35.6% reported that non-pasteurized or both pasteurized and non-pasteurized milk can be consumed. Therefore awareness should be generated to make them understand about importance of pasteurizing milk before consuming.

2. **Milker's hygiene**- Dairy farm workers are actively involved in milking and handling of cattle. Therefore it is important factor which is assessed as milk production is manual and they are vulnerable to infection and zoonotic diseases because of their proximity. General hygiene practices involve Hand washing, usage of soap and clean towel, wearing clean clothes etc. The study indicates that 76.6% of workers believe that washing hands are important with 73.7% think that they should wash hands before milking and 70% after milking. The percentage is slightly less for washing hands after milking, probably because they skip washing considering it as unimportant or tedious work.

60% of farm workers reported importance of using soap and only 57.4% think that using clean towel is necessary. 68.3% of farm workers believe that wearing clean clothes during work is not important. The profession involves working for long hours in unhygienic environment. Lack of knowledge on maintaining personal cleanliness and milking activity early in the morning and late evening, might have prevented them from wearing clean clothes at work place .There is large dependence of farm workers on tobacco products.50.8% reported that tobacco usage is not prevented during milking and handling cattle.

3. **Cleanliness of farm area**-Cleanliness of farm area is important to maintain hygienic environment of cattle and farm personal. 60% of farm workers reported that farm floor is cleaned once or twice a day, while 40% clean farm 3 or 4 times a day. Majority of farm workers follow proper disposal of dung, 16.4% think that dung could be lie here and there while rest throw dung in drainages (41.6%) or used for household purposes (24.6%). Few of them (11.5%) have appointed workers who come and pick away the dung.

TABLE-4.3

Hygienic milk production practices followed by farm workers:-

S.no	Parameter	Frequency	Percentage of workers following ideal practice
1	Isolation of cattle when sick Yes (1)	 32	 46.7%
2	Periodic health checkup Yes checkup (2) Sometimes when sick(1)	 35 16	 58.3% 26.2%
3	Periodic checkup by whom Doctor(2) Self(1) Both doctor and self(3)	 39 8 6	 65% 13.3% 10%
4	Vaccination of cattle YES (1)	 27	 45%
5	Udder management Full practice(2) Partial practice(1)	 29 11	 49.9% 18.6%
6	Teat milk solution used Water(1) Detergent or soap(2) Potash or other medicinal solution (3)	 40 4 4	 66.7% 6.7% 6.7%
7	Solution for cleaning of utensils Water(1) Detergent or soap water(2)	 46 11 3	 76.6% 18.3% 5%

	Other disinfectants like potash(3)		
8	Availability of lid Yes (1)	57	95%
9	Work when sick No (1)	27	45%
10	Filtration of milk Yes (1)	52	86.6%
11	Solution used cleaning floor Water (1) Detergent or soap solution (2) Dettol or phenyl water (3)	 46 11 3	 76.6% 18.3% 5%
12	Any Wounds on injury on hands of workers No (1)	37	61.7%

*Scoring is given in brackets

CLEAN MILK PRODUCTION PRACTICES FOLLOWED BY FARM WORKERS

1. **HEALTHY HERD MANAGEMENT**

Regarding healthy cattle management 58.3% of farm workers provide periodic health checkup of cattle while 26.6% reported cattle checkup when sick.65% consult a doctor for checkup .Around 15% does not care much about cattle health.45% of workers said that cattle are vaccinated against diseases like foot and mouth disease, tuberculosis, brucellosis. While rests do not have appropriate knowledge on vaccination of cattle.53.3% of farm workers do not separate unhealthy cattle from the diseased ones. This is probably because of space constraints and unawareness on disease transference from unhealthy cattle. Overall there is low practice of proper herd management with little priority given to health needs.

2. **CLEANLINESS OF UTENSILS**.

Equipment must be made from appropriate food-grade material and must be kept clean and in good condition at all times. Immediately after milking, equipment must be cleaned, disinfected and rinsed with potable water. Most of the farm workers use containers made up of stainless steel and aluminum with few use plastic buckets or bronze material. 95% reported they have suitable

lid available to cover the utensils. This will prevent extraneous material like dust, hay, mosquitoes, and flies to enter the vessel.76.6% of workers use normal water for washing containers.18.3% use soap or detergent while only 5% use other disinfectants like potash .More than 50% wash utensils twice or thrice a day.

3. **MILKING HYGIENE**

Good udder management is essential to maintain the health of cattle and milk quality. Udder management includes pre and post washing of udder and drying it with clean cloth. From the questionnaire we try to get insight whether they practice full other management or not. Only 49.9% of farm workers practice full udder management. 66.7% use water for cleaning the teats while 20% don't use any teat solution for washing teats. Few (6%) reported usage of potash and other medicinal solutions for teat washing. 86.6% of farm workers filter milk before pouring into vessel.

55% of farm workers reported that they work even they are sick .This is probably because majority of them belong to lower income groups and they can't afford to take leave. There are no stringent rules which regulate their practice.38% have some or other kind of cut or sore on hand and forearm.

4. TRANSPORTATION

Milk is transferred in vessels to nearby areas of Delhi like Subash nagar , kirti nagar,dwarka,tiilak nagar etc. via suitable vehicles like car, truck and bikes

TABLE-4.4

Respondents are categorized into three groups based on the mean and standard deviation as a measure of check.

SD=Standard deviation

KNOWLEDGE TABLE

S.NO	PARTICULARS	CATEGORY		Frequency	Percentage
1.	Knowledge on clean milk production practices	Less than 4	Category 1	8	13.3%
		4-7.5	Category 2	40	66.6%
		More than 7.5	Category 3	12	20%
2.	Practice of clean milk production practices	Less than 8.4	Category 1	11	18.3%
		Between 8.4-13.8	Category 2	35	60%
		Above 13.8	Category 3	13	21.6%

Knowledge level regarding clean milk production practices: Overall knowledge level regarding clean milk production practices: Adequate knowledge is essential to dairy farm workers for the successful and profitable dairy farming. The data regarding level of knowledge are given in Table 4. It can be observed that 66.6% Per cent of the dairy farm workers belong to category 2, while 13.3% and 20% per cent of dairy farm workers belong to category 1 and 3, respectively.

Overall Practices of clean milk production practices followed by dairy farm workers

From the study it indicates that 60% of the dairy farm workers belong to category 2, followed by 21.6% per cent and 18.3% per cent of the dairy farm workers belong to category 1 and 3, respectively.

CROSS TABULATION –TABLE 4.5

1. CROSS TABULATION OF MEAN PRACTICE SCORE WITH SOCIO ECONOMIC STATUS.

PRACTICE CATEGORY	SOCIO ECONOMIC STATUS			TOTAL
	LM	UL	UM	
CATEGORY 1	3	5	3	11
CATEGORY 2	8	16	12	36
CATEGORY 3	6	5	2	13

2. CROSS TABULATION OF MEAN PRACTICE SCORE WITH AGE.

PRACTICE CATEGORY	AGE CATEGORY			TOTAL
	1	2	3	
CATEGORY 1	8	3	0	11
CATEGORY 2	17	14	3	34
CATEGORY 3	7	3	1	11

3. CROSS TABULATION OF MEAN PRACTICE SCORE WITH EXPERIENCE.

KNOWLEDGE CATEGORY	EXPERIENCE				TOTAL
	0-10	10-20	30-40	40-50	
CATEGORY 1	6	4	1	0	11
CATEGORY 2	12	12	9	1	34
CATEGORY 3	4	5	2	1	12

4. CROSS TABULATION OF MEAN KNOWLEDGE SCORE WITH SOCIO ECONOMIC STATUS.

KNOWLEDGE CATEGORY	SOCIO ECONOMIC STATUS			TOTAL
	LM	UL	UM	

CATEGORY 1	5	3	0	8
CATEGORY 2	15	9	16	40
CATEGORY 3	6	5	1	12

5. CROSS TABULATION OF MEAN KNOWLEDGE SCORE WITH AGE

KNOWLEDGE CATEGORY	AGE CATEGORY			TOTAL
	1	2	3	
CATEGORY 1	3	4	0	7
CATEGORY 2	23	11	4	38
CATEGORY 3	6	5	0	11

6. CROSS TABULATION OF MEAN KNOWLEDGE SCORE WITH EXPERIENCE.

KNOWLEDGE CATEGORY	EXPERIENCE				TOTAL
	0-10	10-20	30-40	40-50	
CATEGORY 1	1	4	2	0	7
CATEGORY 2	17	13	7	1	38
CATEGORY 3	4	4	3	1	12

TABLE-4.6

Association between practice levels with different factors like age, Socio economic status, experience.

S.NO	Variables	p value	Significance
1	Socio economic status	.000	S
2	Age	.616	NS
3	Experience	.732	NS

NS = Non-significant and S indicates of significance of values at P= 0.05

TABLE-4.7

Association between Knowledge levels with different factors like age, Socio economic status, experience.

S.NO	Variables	p value	Significance
1	Socio economic status	.076	NS
2	Age	.418	NS
3	Experience	.683	NS

NS = Non-significant and S indicates of significance of values at P= 0.05

Independent variables and adoption level of dairy farm workers towards CMP practices.

The effect of Age, Socio economic status, and experience on adoption level toward CMP was given in Table-6.1.From the data it revealed that Socio economic status has a significant relationship on practices adopted by farm workers, whereas other factors like age and experience do not show significant relationships. This is probably because there is number of other factors which need to be explored that could have influence on CMP practices.

Independent variables and knowledge level of dairy farm workers towards CMP practices.

The effect of age, Socio economic status, and experience on knowledge level and awareness of farmers toward CMP was given in Table-6.2 the data revealed that age, education, and herd size didn't affect the knowledge level and awareness of farmers toward CMP Practices as mean correct responses difference among different age, Socio economic groups remained non-significant.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

This section presents the discussion of the findings on knowledge and practices of clean milk production in southwest Delhi. Conclusion and Recommendations are also included.

Milk is the main product of dairy farm industry, produced mainly for human consumption. A dairy farmer must therefore aim at maximizing on milk output from his/her dairy herd. At the same time the farmer must ensure that milk is produced in clean and hygienic conditions so that it is fit for human consumption. From public's health point of view, milk is a very good media for bacterial and other micro-organisms development. As such, disease hazard in public can easily be predisposed by infected milk during production, handling and marketing. As business milk, if it is not fit for human use is economical loss to the producing farmer.

Knowledge and practices of Clean Milk Production followed by the dairy farmers are shown in Table 2and 3 respectively. A critical perusal of the data furnished portrays that farm workers follow few practices like filtration of milk and covering utensil with lid, cleaning of utensils, and periodic examination with doctor. There is low practice of few activities like Isolation of cattle from the diseased ones (46.6%), vaccination of cattle (45%).Another study on adoption of quality milk production ,wardha district of Maharashtra stated slightly better adoption practices. 68% of farm workers vaccinate milking animals regularly (partial adoption) and around 95% of workers wash utensils with water or caustic soda.(13)around 67 %(partial adoptions) of farm workers follow regular examination of milking animal by veterinary doctor.

Cleaning of utensil is the major part of CMP practices, where utensil is prone to aspects related to milk quality deterioration. So, there was an urgent need was felt to know the knowledge level of dairy farmers regarding cleaning of utensils. The study showed cleaning of utensils with water is 76.6% and 18.3% use detergents for washing utensils. Few of the farm workers use teat dip solution (6.6%). This is contradictory to a study in Kerala, where there high usage, around 87% of workers use detergents for washing utensils but Nobody was aware of any teat dip solution like iodophores.(5)

This study revealed that dairy farmers have satisfactory knowledge on few aspects of CMP like importance of hand washing (76.6%) both pre (76.6%) and post (70%).There are less than 50% have knowledge on these activities –Importance of clean clothes ,Tobacco usage prevention. Health of the farm workers is neglected.55% of workers work even when they are sick. There is high dependence of farm workers on tobacco products. The findings of another study showed only 12 % of farm workers ensure personal hygiene.(5)

The study revealed that variables age , experience and socio economic status hold an insignificant relationship with knowledge level of dairy farmers. Socio economic status has a significant relationship on practices adopted by farm workers, whereas other factors like age and experience do not show significant relationships .Another study on Practice wise knowledge and adoption of clean milk production by dairy farm women in Junagadh district reported positive relationship of variable experience on knowledge and practices adopted by farm workers whereas age has non-significant correlation with adoption of clean milk production practices of dairy farm women. (12)

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5.2 CONCLUSION

Milk is essential commodity which is consumed by large number of consumers. Maintaining the quality is important for both health and financial perspectives .Dairy farmers' knowledge from the study is inferior in few factors like Udder management, Personal hygiene of workers, Care of cattle, cleanliness of farm area. There is satisfactory knowledge on hand hygiene. There is utmost need to provide quality training to them with regard to clean milk production practices.. A critical perusal of the data furnished portrays that farm workers follow few practices like filtration of milk and covering utensil with lid, cleaning of utensils, and periodic examination with doctor. There is low practice of few activities like Isolation of cattle from the diseased ones, vaccination of cattle.

quality is required in each aspect of clean production of milk. Proper standards which guide the working condition of the farm workers should be made. Information on hazards of consuming contaminated milk should be extended to public. Veterans, subject matter specialist and health workers can be send to train farm workers regarding hygiene practices.

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ANNEXURE -1

Consent form:

ID No. : _____

You are invited to participate in a research study conducted by Ikra Ahmed, a student of International Institute of Health Management Research, Dwarka, and New Delhi. I am conducting study on "Knowledge and practice about hygienic milk production among dairy farm workers, south west Delhi". All responses will be kept confidential. Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. Your identity will not be revealed in any publication resulting from this study. Your interview responses will only be shared with research team members. It is very important for the success of this study that you take part in this survey. There are no known risks associated with this research.

Signature/ Thumb Impression

Kindly mention

Consent accepted_____ Consent rejected_____

ANNEXURE -2

Questionnaire used for farmer interviews

This questionnaire is designed to extract suitable information and knowledge of small holder dairy farm workers regarding clean milk practices. It contains both open ended and close ended questions to get in depth information.

Date _____ Location _____

Interviewer _____

I. **General Information**:

1. Age _____

2. Education (participant) _____Education of the head of family_____

3. Occupation of the head of family / primary source of income: ___

4. Income from all sources_____ (per month)

5. Number of years of experience in dairy farming _____

6. Number of lactating cows: _____, Milk yield (kg/day): _____

II. . **Nutrients:**

1. Type of feed used: _____

2. Source of water: ___ deep well water, ___ tap water _____, boring_____ .Is sufficient clean water available? Yes ___NO____

III. **Veterinary Medicine:**

3. Isolation of sick cows from healthy cows? If so, where and for how long?

_____

4. Periodic health check: ___ No, ___ Yes – by whom? _____

5. Vaccinations given: ___ (yes/no). Do you know which diseases they are vaccinated against (yes/no) _____ Please tell us which diseases. Brucellosis, ___ Tuberculosis ___ other – list: _____

IV. Milking:

6. ___ Milk by machine

___ Milk by hand

7. Use good hygiene practices for udders before milking:

___ Yes- what process? _____

Pre wash of udder before milking (Yes /NO) _____

Post wash of udder after milking (Yes/No) _____

Discard few drops of milk before milking (Yes/No) _____

8. Dip teats after milking- solution used: _____

9. In what type of container is the milk collected during the milking process?

_____

Is this container cleaned/disinfected between milking periods?

___ Yes, how often? _____ what process and solution used? _____

_____

10 After milking do you keep milk in refrigerator for cooling? NO _____If Yes, for how long ____

11. What kind of milk should we consume? Pasteurized_____ non-pasteurized_____

12 Whether suitable lid is available to cover the utensil? YES ____NO _____

V. Milker Hygiene

13. Do you think hand washing is important? _____

14. When do milkers wash their hands?

___ Before eating ___before cooking, ___ Before milking ___ After milking

15. Do milkers wash their hands with soap?

___ Yes, ___ No, ___ Sometimes

16. After washing, do milkers dry their hands with a clean towel?

___ Yes, ___ No, ___ Sometimes

17. If milkers are sick, do they still go to work?

___ Yes, ___ No, ___ Sometimes

18. Chewing and spitting with tobacco, smoking and gutka is avoided during milking and after milking.

_____YES ___No_____ sometimes

19. Milk filtered before pouring into vessel? YES___NO_____

20. Do you have any kind of cut or sore on hand and forearm? Yes ____NO____.

Is it important to wear gloves and clean clothes while milking cattle? YES _____ NO_____?

VI. **Animal Hygiene**:

21. Is it important to clean floor? Yes____ No____

22. How often floor is cleaned each day?

__ Several times, __ only before milking (2x), __ before and after milking (4x)

___ other- please explain: _____Cleaned with what? ___ Water, ___Solution- what? _____

22. What is done with the cow manure? _____

VII. Transportation

23. How is milk transferred from farm to collection station? _____What type of container is used for transfer? _____

ANNEXURE -3

Questionnaire in Hindi

किसान साक्षात्कार के लिए प्रयुक्त प्रश्नावली

दिनांक _ _ _ स्थान _ _ _

नाम _ _ _

I. **सामान्य जानकारी**:

1. उम्र _____

2. शिक्षा (भागीदार) ___ परिवार के मुखिया की शिक्षा _____

3. परिवार के मुखिया का काम _____

4. आय (प्रति माह) सभी स्रोतों से _____

5. डेयरी खेती में अनुभव के वर्षों की संख्या ____

6. स्तनपान कराने वाली गायों की संख्या:_____ दुग्ध उत्पादन (किलोग्राम प्रतिदिन): ____

II. । **पोषक तत्व:**

1. खाद्य /फ़ीड उपयोग के प्रकार: _____ प्रति दिन मात्रा ___

2. पानी का स्रोत: ____ नल का पानी____भूमिगत (boring)___ क्या पर्याप्त स्वच्छ पानी उपलब्ध है? हाँ ___नहीं ___?

III. **पशु चिकित्सा:**

3. स्वस्थ गायों से बीमार गायों का (isolation)अलगाव? यदि हां, तो कहां और कब तक?_____

4. आवधिक स्वास्थ्य जाँच (periodic health checkup):_____नहीं, हाँ-किसके द्वारा _____?

_____

5. Vaccinations दिया: _____(हां/ नहीं) ब्रूसेलोसिस (brucellosis)____, अन्यतपेदिक (tuberculosis) _____अन्य कोई ____ नहीं-क्यों नहीं? _____

IV. दूध:

6. दूध मशीन द्वारा____

हाथ से दूध _____

7. स्तन (udders) के लिए दूध देने के पहले अच्छा स्वच्छता अभ्यास का उपयोग करें(Use good hygiene practices for udder. Before milking)

हाँ - क्या की प्रक्रिया? _____

- दूध देने के पूर्व थन धो (हाँ/नहीं) _ _ _
- दूध देने के बाद के बाद थन धो _ _ _ (हाँ /NO)
- दूध देने से पहले थनों का दूध की कुछ बूँदें छोड़ें) _ _ _ (हाँ/नहीं)

8.. उपयोग करने के बाद निपल दुहना ____ समाधान_____(Dip teats after milking- solution used)

9.. दुहना प्रक्रिया के दौरान किस प्रकार के कंटेनर(utensil) में दूध एकत्रित की जाती है?

_____

इस कंटेनर दुहना अवधियों के बीच साफ/कीटाणुरहित(disinfected) किया हुआ है?

हाँ____ कितनी बार ___? क्या प्रक्रिया और समाधान उपयोग _____?

10., कब तक दूध देने के बाद दूध एक प्रशीतित टैंक(refrigerator) में ठंडा हो रहा है? _____

11. किस तरह दूध का हम उपभोग करना चाहिए? उबला हुआ (Pasteurized)___ गैर- उबला हुआ (nonpasteurized)___

12.क्या बर्तन को कवर करने के लिए उपयुक्त ढक्कन उपलब्ध है? हाँ ___ नहीं ___?

V. Milker स्वच्छता:

13. क्या आपको लगता है कि हाथ धोने महत्व पूर्ण है? _ _ _

14. कब (milkers) दूध आदमी उनके हाथ धोना चाहिए?

पहले खाने ____या खाना पकाने पहले_____ दूध देने(milking) बाद ____ दूध देने पहले ____

15 (milkers) दूध आदमी अपने अपने हाथ साबुन के साथ धोना है?

हाँ___कभी-कभी ____ नहीं_____

16. हाथों की सफाई के लिए क्या (milker)साफ तौलिया का उपयोग करना चाहिए?

हाँ____, कभी-कभी ____ नहीं____,

17. यदि दूध आदमी(milker)बीमार हैं, वे काम करने के लिए जाते हो?

हाँ_____, कभी-कभी _____ नहीं____

18. दूध देने के दौरान gutka चबाने और थूकना तंबाकू, और धूम्रपान के साथ से बचना है।

हाँ____कभी-कभी ____नहीं,

19. दूध बर्तन में डालने का कार्य करने से पहले फ़िल्टर किया गया? हाँ ____ नहीं ___

20. आप के हाथ पर चोट या घाव है? हाँ ___ नहीं ___?. गाय के दूध देने के दौरान दूध आदमी का दस्ताने और साफ कपड़े पहनने महत्वपूर्ण है? हाँ ___नहीं ___?

VI. **पशु स्वच्छता** :

21. कितनी बार प्रत्येक दिन फर्श साफ है?

कई बार_____, केवल दूध देने से पहले(2 एक्स), _____ दूध देने से पहले और के बाद____(4 एक्स)

_____अन्य-समझाने कृपया: ___(Cleaned) कैसे साफ? पानी ___Solution क्या_____?

22. गाय गोबर के साथ क्या किया जाता है? उर्वरक के रूप में __Used, __Other, कृपया समझा दे: _____

VII. परिवहन

23. कैसे दूध फ़ार्म से संग्रह स्टेशन तक पहुँचा है? (transportation mode)_____किस प्रकार कंटेनर(utensil) स्थानांतरित करने के लिए उपयोग किया जाता है? _____

ANNEXURE 4

SOP FOR CLEAN MILK PRODUCTION(NATIONAL DAIRY DEVELOPMENT BOARD)
Clean Milk Production 1. Give sufficient, quantity of feed and drinking water to cattle prior to milking. 2. Remove accumulated cow dung. 3. Cattle shall be bathed and if bath is not possible dry cleaning by broom / duster

should be done.

4. Maintain the cattle clean and healthy.

5. In case animal is under treatment; discard the milk during the withdrawal period of the treatment. Do not bring the milk to DCS/MPI, if the cattle are suffering from any disease.

6. Clean the cattle shed floor either by washing with water or dry cleaning 10 – 15 minutes before milking.

7. The floor should not be slippery. It should be firm and dry so as to provide a proper foothold to the animal while rising or standing.

8. Clean the udder and teats of the cattle by clean (potable) water and wipe using a dry & clean CLOTH.

9. Use separate vessel for washing of udder and teats & for milking.

10. Teats should be cleaned after sucking, if cattle is letting down the milk by calf sucking.

11. Clean thoroughly the milk collection vessel preferably with detergent and hot water etc and keep it inverted to dry before milking.

12. Milker should wash his/her hands with soap to make them clean and germ free.

13. Milker should wear clean clothes.

14. Milker should avoid contact between milk and his body parts, clothes and other belongings.

15. Chewing and spitting with tobacco, smoking and gutka should be avoided during milking.

16. Sneezing/ coughing towards udder/vessel during milking should be avoided.

17. Milker should not be suffering from any respiratory ailment or contagious disease.

18. Milker should not have any open sores or cuts.

19. Discard the initial milk from all the four teats to minimize the bacterial load.

20. Flies, hay, husk, dry cow dung cake or other extraneous matter should not get into the milking vessel.

21. After milking rinsing of teats in a dis-infective solution (with water, iodophor etc.) shall be done to avoid post-milking infection.

22. It is good to keep the animals standing for at least half an hour after milking. Feed may be provided to encourage this.

23. Avoid use of measures, tumbler etc. in the milking vessel for removing or to transfer milk from milking pail.

Milking Utensils and Storage Vessels

1. The utensils and the storage vessels should be of SS 304 construction and free from sharp edges.

2. A suitable size lid should always be used to cover the utensils and the vessel.

3. They should be cleaned and sanitize before and after their use and kept dry.

4. They should be exclusively used for milking.

5. The milk should be filtered before pouring into the vessel.

Delivery of milk to DCS/MPI

1. Milk should be carried in SS utensils/ SS Cans.

2. The utensils should be the same in which the milking is done to avoid contaminations due to multiplicity of vessel etc.

3. A suitable size lid should always be used to cover the utensils.

4. Milk should be brought to DCS/MPI as quickly as possible after milking to avoid multiplication of harmful bacteria