

Zoonoses Risk – Perception of Dairy Farmers of Haryana

BY
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CERTIFICATE I

This is to certify that this dissertation entitled, **“Zoonoses Risk – Perception of Dairy Farmers of Haryana”** submitted in partial fulfillment for the degree of **Doctor of Philosophy (Ph.D.)** in the subject of **Veterinary and Animal Husbandry Extension Education** of the **Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar**, is a bonafide research work carried out by **Rakesh Ahuja** under my guidance and supervision, and that no part of dissertation has been submitted for any other degree.

The assistance and help received during the course of this investigation have been fully acknowledged.

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CERTIFICATE II

This is to certify that this dissertation entitled, **“Zoonoses Risk – Perception of Dairy Farmers of Haryana”** submitted by **Rakesh Ahuja** to the **Lala Lajpat Rai University of Veterinary and Animal Sciences**, Hisar in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy (Ph.D.)** in the subject of **Veterinary and Animal Husbandry Extension Education** has been approved by the Student’s Advisory Committee after an oral examination on the same.

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ABBREVIATIONS

A.I.	: Artificial Insemination
A.H.	: Animal Husbandry
Avg.	: Average
B.V.Sc.	: Bachelor in Veterinary Science
B.Q.	: Black Quarter
CCS HAU	: Chaudhary Charan Singh Haryana Agricultural University
CD Block	: Community Developmental Block
CMP	: Clean Milk Production
COVS	: College of Veterinary Sciences
Dept.	: Department
DI Lab	: Disease Investigation Laboratory
FAO	: Food and Agricultural Organisation
FMD	: Foot and Mouth Disease
HAU	: Haryana Agricultural University
H.S.	: Haemorrhagic Septicaemia
hecs.	: Hectares
Hrs	: Hours
ICAR	: Indian Council of Agricultural Research
KVK	: Krishi Vigyan Kendra
LUVAS	: Lala Lajpat Rai University of Veterinary and Animal Sciences
MPS	: Mean Percent Score
MS	: Mean Score
MT	: Metric Tonne
M.V.Sc.	: Master of Veterinary Science
N-CMP	: Not covered under Clean Milk Production
NGO	: Non Government Organization
OBC	: Other Backward Class
Ph.D.	: Doctor of Philosophy
SC/ST	: Schedule Caste/Schedule Tribe
SD	: Standard Deviation
SDO	: Sub-Divisional Officers
SHG	: Self Help Group
USA	: United States of America
T.V.	: Television
VAS	: Veterinary Assistant Surgeon
VLDA	: Veterinary Livestock Development Assistant
VLI	: Veterinary Livestock Inspector
VO	: Veterinary Officer
VS	: Veterinary Surgeon

CHAPTER-I

INTRODUCTION

“If health is present in every dimension of life, it also implies that risk is everywhere. This has significant consequences for how we frame health policies and where we assign responsibilities for health in society.”

Kickbusch (2007)

There are growing issues throughout the world of ensuring a food supply safe from food-borne hazards and protecting people against transfer of novel diseases. These changes have arisen from the growth of the global human population and the extreme pressures it has placed on the environment, particularly at the interface between human food production systems and natural ecosystems (Bruckner *et al.*, 2002). In industrialized nations, approximately 360 million food-borne disease cases occur annually and in developing nations an estimated 1.9 billion annually (WHO, 2002). Further, WHO states that about 1.8 million persons died from diarrheal diseases in 2005, mainly due to the ingestion of contaminated food and drinking water.

Besides other sources, pathogens circulating in animal populations can threaten both animal and human health, and thus both the animal and human health sectors have a stake in, and responsibility for, their control. Pathogens – viruses, bacteria or parasites – have evolved and perfected their life cycles in an environment that is more and more favorable to them and ensures their continuity through time by replicating and moving from diseased host to a susceptible new host (FAO, 2010). Various elements are responsible for emergence of these pathogens including continuous increase in human and animal population bringing increasingly larger numbers of people and animals into close contact, the infectious agent itself undergoing genetic drift and shift enhancing the virulence, adverse climatic changes, reduction in travel time making it possible to circumnavigate the globe in less than the incubation period of most infectious agents and ecological changes caused by human activities like deforestation, urbanization and dam building, and alteration of immune status of population (Woolhouse and Gowtage-Sequeria, 2005).

Recently many emerging and re-emerging infectious diseases of humans have originated from animals, but the phenomenon is not new. Indeed many of the present-day human pathogens (measles, respiratory syncytial virus) originated from domesticated animals and evolved during their co-evolution with humans (Pearce-Duvet, 2006). Infectious diseases account for 29 out of the 96 major causes of human morbidity and mortality listed by the World Health Organization and the World Bank (Murray and Lopez, 1996) and 25 per cent of global deaths (over 14 million deaths annually) (WHO, 2000). These infectious diseases are a dominant public health problem even in the 21st century. The World Health Organisation estimates 25 per cent of the total 57 million annual deaths that occur worldwide are caused by microbes and this proportion is significantly higher in the developing world (Chugh, 2008).

It is estimated that over 600 million people worldwide are livestock-dependent, and represent up to 70 per cent of the marginalized and poor population (FAO, 2004). In Asia, high animal densities and urbanization create a close relationship between humans, domestic animals and wildlife. This has been one of the causes of recent emergence or re-emergence of zoonotic animal diseases (Forman *et al.*, 2008). With the world's second largest human population, two biodiversity hotspots (Myers *et al.*, 2000), and one of the world's greatest densities of tropical livestock (Thornton, 2002), India possesses a favourable environment for the transmission of communicable diseases between man and animals (Jones *et al.*, 2008; Forman *et al.*, 2008). Measures aimed at preserving cleanliness, preventing pathogen build-up and breaking possible pathways of transmission are essential in the management of any modern farming enterprise, regardless of the species or the farming system (Ganaderas *et al.*, 2010)

Poor consumers currently have to face greater risks from food-borne infections (Bruckner *et al.* 2002). Unhygienic practices during food preparation, handling and storage creates the conditions that allows the proliferation and transmission of disease causing organisms such as bacteria, viruses and other food-borne pathogens (Fielding *et al.*, 2001 and Gent *et al.*, 1999).

The problem of zoonoses is multi-factorial and one of the major constraints that all organizations have in controlling zoonoses is the lack of resources. However, much can be done by education, and in particular by increasing the awareness of

different health professionals, and facilitating communication and collaboration between veterinary, public health and agricultural personnel (Abera *et al.*, 2016). It is important that dairy personnel or farmer have a clear understanding of the farm's policy and works instructions, and have the right attitude to personal and operational hygiene. The biosecurity measures undertaken on farms appear to depend not only on economics or feasibility, but on producers' understanding of the principles of biosecurity and their attitudes towards and motivations for undertaking/ not undertaking such disease preventive measures (Gilmour *et al.*, 2011). It has been opined that when dealing with emerging zoonoses, the first priority is seeking knowledge how to deal with the zoonosis. This knowledge is the input of a control strategy (Boekhorst *et al.*, 2010). However, empirical information about the farmers' knowledge and communication behaviour in preventing zoonoses is lacking.

Even though, the farmers in India have been living in close proximity to the animals traditionally, but the chances of zoonotic diseases were far less given the lower density and frequency of interaction. The situation has changed drastically in the past few years. There is an increasing intensification of the livestock production systems and mobility of both domestic animals and humans is on rise. The threat of zoonotic diseases being contracted and their spread is significantly higher now. In such a situation, the role of veterinarians in educating the farmers, detecting such diseases and responding quickly to such threats is vital. However, it has been argued that the attitude towards livestock-associated risks may differ between persons (including veterinary experts) working in livestock industry or elsewhere, for example in public health. Perhaps—according to contemporary demands - the attitude towards risks associated with livestock production is sometimes even somewhat too lax or too little among professionals working in the livestock industry (Kimman *et al.* 2013). Zoonoses act as a double edged weapon, one by causing serious and fatal diseases in human beings and other by undermining animal health and productivity and thus producing great financial losses to the animal industries. The knowledge of the zoonoses is the fundamental for the veterinarians, as they are the first on the line of duty (Pal, 2013). Cripps (2000) argued many of human health workers and veterinarians may not appreciate the relevance or importance of zoonoses even though they have theoretical understanding of the threat. But there is lack of empirical information about attitude of veterinarians towards the zoonotic diseases in India.

In this backdrop it was felt necessary that there is an urgent need to conduct a systematic study in this important area of growing concern. Clearly, there is need to conduct scientific study in terms of farmers' knowledge about zoonoses, the practices they adopt while handling animals, opinion of veterinary professionals about animal hygiene, etc. Therefore, the present study was proposed with the following specific objectives:

Objectives:

- 1.) To assess the knowledge of dairy farmers about prevention of zoonotic diseases
- 2.) To ascertain the communication behaviour of dairy farmers regarding prevention of zoonotic diseases
- 3.) To document zoonotically undesirable practices being followed in the milk production systems
- 4.) To develop a scale to measure attitude of the veterinary professionals towards animal hygiene
- 5.) To measure the attitude of veterinary professionals towards animal hygiene

LIMITATION OF STUDY: Though the present study resumes great academic and practical relevance, it has some limitations even after making every effort to make this study as comprehensive as possible. The limitations are:

1. Being a student's project, the study suffers from usual limitation of time, money and other resources.
2. The findings are based on ability and honesty of the respondents in providing their responses. Their prejudices and biasness while giving responses cannot be ruled out.
3. The study was carried out in particular situation, system and sample. Hence the findings of the study should not be generalized beyond the limits of the area under investigation and other areas having similar agro climatic and socio-economic conditions.
4. Although study included most of the variables relevant for the study, some intervening variables may still be missing.

In spite of limitations it is hoped that the findings of the study would be helpful.

CHAPTER-II

REVIEW OF LITERATURE

The chapter briefly reviews the available literature relevant to the study. The review has been done in following sub-sections:

2.1 Profile of the dairy farmers

2.2 Profile of the Veterinary Professionals

2.3 Concepts of zoonoses

2.4 Knowledge of respondents regarding zoonotic diseases

2.5 Communication behaviour of respondents

2.6 Milk production practices

2.7 Concepts of Animal Hygiene

2.8 Attitude of Veterinary Professionals towards animal hygiene

2.1 Profile of the dairy farmers

2.1.1 Age:

Hundal *et al.* (2016) conducted a study based on data collected from livestock farmers who visited the Guru Angad Dev Veterinary and Animal Sciences University from different districts of Punjab and revealed that 28% of farmers belonged to up to 25 year age category, and 42per cent belonged to 26-40 years age group, and rest 30per cent were of higher age groups.

Munisamy *et al.* (2017) conducted a study in Peralambur district of Tamil Nadu State and revealed that 85 per cent were belonging to 26-50 years age.

Atreya *et al.* (2018) revealed that in case of member dairy farmers in district Sultanpur, the maximum number of respondents (58%) was observed in middle age category followed by young (25%) and old (17%) respectively. Likewise, in case of Non member of dairy farmers, the majority of the respondents (59%) were observed in middle age category followed by young (23%) and old (18%), respectively.

Singh *et al.* (2019) conducted a study on livestock (cattle/buffalo/sheep/goat/pig) farmers residing in the rural areas of Punjab and found that majority (24.56%) of livestock owners were belonging to age group of 21–30 years while 12.22, 19.90, 19.55, 14.20 and 9.54 per cent of livestock owners were hailed to age group of 11–20, 31–40, 41–50, 51–60 and 60+ years of age, respectively.

2.1.2 Education:

Hundal *et al.* (2016) conducted a study based on data collected from livestock farmers from different districts of Punjab and revealed that education level of most of the farmers (77.6%) was up to matriculation or higher secondary, whereas merely 13.6% farmers were having a higher qualification.

Sarita *et al.* (2016) conducted a study and observed that about 84.17 per cent of the respondents in the study were literates. Majority of dairy farmers (57.5%) were having primary or high and secondary level of education. However, 15.83% respondents were illiterate

Singh *et al.* (2016) conducted a study and observed that educational qualification of respondents of Punjab state varied to a great extent including one illiterate farmer. Around 30.39 percent respondents were literate up to secondary level followed by 29.42 percent educated up to matric standard.

Singh *et al.* (2019) conducted a study in the rural areas of Punjab and found that majority (37.25%) of livestock owners were 10th passed while 36.90, 12.45 and 3.49 per cent of livestock owners were 12th passed, Graduate and Post-graduate, respectively. Only 9.89 per cent of livestock owners were found Illiterate.

2.1.3 Experience in dairy farming:

Singh *et al.* (2016) conducted a study and observed that nearly 2/3rd (65.68 percent) of farmers of Punjab state were actively involved in the occupation of dairy farming for more than 20 years, while, 15.68 percent got involved during the last five years. The dairy farming experience of remaining 18.63 percent respondents varied from 6 to 20 years.

Munisamy *et al.* (2017) conducted a study and observed that 57 per cent out of 100 dairy farmers in Peralambur district of Tamil Nadu State had less than 5 years experience.

Singh *et al.* (2019) conducted a study on livestock (cattle/buffalo/sheep/goat/pig) farmers residing in the rural areas of Punjab and found that majority (57.15%) of livestock owners had passed 20+ years since farming while 12.33, 10.94, and 10.71 per cent of livestock owners had farming experience of 0–5, 5–10 and 15–20 years, respectively. Only 8.84 per cent of livestock owners had farming experience of 10–15 years.

2.1.4 Type of Family:

Sarita *et al.* (2016) conducted a study and noticed that 73.33 per cent of dairy farmers belonged to nuclear family while 26.67 per cent hailed from joint family.

Vekariya *et al.* (2016) conducted a study in Junagadh and Gir Somnath districts of Saurashtra region and reported that majority (70.83 %) of the Maldhari dairy farmers belonged to the joint families and only 29.17 per cent of them belonged to nuclear families.

Atreya *et al.* (2018) conducted a study in Sultanpur district and found that the majority of the Member of dairy farmers (74%) belonged to nuclear family while the rest (26%) belonged to joint family. In case of Non member of dairy farmers in majority (69%) belonged to nuclear family, while the rest (31%) respondents belonged to joint family.

2.1.5 Social participation:

Sarita *et al.* (2016) conducted a study on 120 dairy farmers of Hisar district to ascertain their socio-economic and psychological characteristics and observed that majority (66.67%) of respondents were having no participation. About 19 per cent of the respondents were having medium level of participation followed by 8.33 and 5.83 per cent in low and high level of participation category, respectively.

Singh *et al.* (2016) conducted a study of Punjab state and observed that around 13.72 percent farmers had the membership of organisations related to dairy farming, whereas remaining majority (86.28 percent) responded otherwise.

Atreya *et al.* (2018) conducted a study in Sultanpur district and observed that majority (50.00%) of member dairy farmers have membership in two organization followed by 39 percent of members have membership in one organization and 11percent of participation in more than two organizations/office bearer. Similarly, majority of non members (52.00%) have membership in your organization followed by 45.00 percent of non members who have membership only in one organization and 03 percent of participation in more than two organizations/office bearers.

2.1.6 Mass media exposure:

Rachna (2012) conducted a study in Hisar district of Haryana and revealed that majority of women dairy farmers (98.30%) were having very low level of mass media and only 1.70 per cent were having medium level of mass media exposure.

Ahuja (2015) conducted a research study and found that majority of the respondents belonged to the medium level of mass media exposure category followed by farmers having low level of mass media exposure. Slightly less than one forth the number of total number of dairy farmers had high mass media exposure.

Sarita *et al.* (2016) conducted a study on 120 dairy farmers of Hisar district to ascertain their socio-economic and psychological characteristics and observed that majority of respondents had low mass media exposure category with 91.67 per cent while 8.33 per cent of them were hailed to the medium level of mass media exposure category. None of the respondents had high level of mass media exposure.

2.1.7 Caste:

Ahuja (2015) conducted a research study to study the entrepreneurial behavior of dairy farmers in Haryana and revealed that the dairy farming was much popular amongst the general category of farmers with 46.25 per cent followed by 30.63 per cent of OBC category of farmers while SC/ST category of farmers, to the extent of 23.13 per cent, opted dairy farming as their occupation.

Tudu and Roy (2015) concluded that the dairy farming is much popular amongst the SC (40.4%), followed by ST (25.2%) and OBC (22%), whereas only 12.4 per cent of dairy farmers belong to General Caste.

Atreya *et al.* (2018) conducted a study and found that the maximum number of the Member (milk cooperative societies) of dairy farmers (73%) in Sultanpur district, belonged to backward caste followed by scheduled caste (21%) and general caste (06%), respectively. As regards to non member of dairy farmers, the majority of the respondents (65%) belonged to backward caste followed by scheduled (27%) and general (08%), respectively.

2.1.8 Land holding:

Sarita *et al.* (2016) conducted a study on 120 dairy farmers of Hisar district and found that majority (70.83%) of the respondents possessed land. Of these, 45.83 per cent possessed small land holding while 19.17 and 5.83 per cent were medium and large land holders, respectively. However, 29.17 per cent of them were landless.

Singh *et al.* (2016) conducted a study and observed that landholding of respondents of Punjab state ranged between 2-45 acres. About 1/3rd farmers were cultivating 06-10 acres, 19.60 percent had 16-20 acres, and other 19.60 percent farmers were cultivating less than 05 acres of land.

Atreya *et al.* (2018) conducted a study and observed that the majority (93.00%) of the members were found the marginal land holding category followed by 5 percent and 2 percent of members were in small and medium land holding category in Sultanpur district, respectively. Likewise, majority of the non members (98.00%)

were found in the marginal land holding category followed by 2 percent in the medium land holding category.

2.1.9 Herd size:

Sarita *et al.* (2016) conducted a study on 120 dairy farmers of Hisar district and observed that majority (81.66 %) of dairy farmers were having either small or medium herd size. Only 18.34 per cent dairy farmers were having large herd size.

Munisamy *et al.* (2017) conducted a study in Peralambur district of Tamil Nadu State and observed that 53 per cent farmers had less than 5 dairy cows.

Singh *et al.* (2019) conducted a study to understand knowledge, attitude and practices of livestock farmers regarding zoonoses in the rural areas of Punjab and reported that 60.3 per cent of livestock owners were having 0–5 number of animals in the household while 23.98, 8.26 and 4.3 per cent of livestock owners were having 6–10, 11–15 and 20+ animals, respectively. Only 3.14 per cent reared 16–20 numbers of animals.

2.1.10 Extension participation:

Ahuja (2015) conducted a research study and found that majority of the dairy farmers were falling under the medium level of extension contact.

Sarita *et al.* (2016) conducted a study on 120 dairy farmers and revealed that majority of dairy farmers of Hisar district were in low level of extension contact category to the tune of 89.17 per cent whereas 10.83 per cent of them hailed to medium level of extension contact.

Vekariya *et al.* (2016) conducted a research study in Junagadh and Gir Somnath districts of Saurashtra region and found that more than half (53.34 %) of the Maldhari dairy farmers had medium level of participation in extension activity followed by 33.33 per cent and 13.33 per cent as low and high participation in extension activity, respectively.

2.1.11 Risk orientation:

Das (2003) conducted a research study to study the socio-economic and cultural profile of the Van Gujjars and found that a large majority (72.00%) of the nomadic Van Gujjars had medium category of risk orientation. There were 16.00 percent of the nomadic Van Gujjars who had high risk taking ability; whereas only 12.00 percent of them had low risk bearing capability. As far as risk bearing ability of the resettled respondents is concerned, a good number (46.67%) of them were having moderate level of risk orientation; whereas, 28.00 percent of them were less willing to

take risk. However, around one-fourth (25.33%) of the resettled Van Gujjars were found to be high risk takers.

Rakesh *et al.* (2017) conducted a study on decision making ability and risk orientation among dairy farmers and correlates with their socio-economic and psychological characteristics in 12 villages of Hisar and Jind districts of Haryana and found that maximum numbers of respondents were found to have high level of risk orientation to the extent of 43.13 per cent, followed by medium (34.38%) and low (22.50%) level.

2.1.12 Scientific orientation:

Prajapati (2011) revealed that 64.67 per cent of tribal dairy farmwomen women in five tribal talukas of Vadodara district in Gujarat State had medium scientific orientation, followed by 19.33 and 16.00 per cent had low and high scientific orientation, respectively.

Gulkari *et al.* (2014) conducted a study in Junagadh and Gir Somnath districts of Saurashtra region and reported that around 85 percent of the respondents were having low to medium level scientific orientation and risk taking capacity

Ahuja (2015) conducted a research study and observed that majority of the respondents (60%) in Hisar and Jind districts of Haryana possessed medium level of scientific orientation.

2.1.13 Economic motivation:

Prajapati (2011) revealed that nearly two-third (63.33%) of the dairy farmwomen women in five tribal talukas of Vadodara district in Gujarat State had medium economic motivation, whereas 18.67 and 18.00 per cent of them high and low economic motivation, respectively.

Rachna (2012) conducted a study in Hisar district of Haryana and found that 78.3 per cent of women dairy farmers had medium category of economic motivation, followed by high (15.00%) and low (6.70%) category of economic motivation.

Sarita *et al.* (2016) conducted a study of Hisar district to ascertain their socio-economic and psychological characteristics and observed that majority (73.34%) of the dairy farmers had medium economic motivation while 23.33 per cent of respondents were having high economic motivation.

2.2 Profile of the Veterinary Professionals

2.2.1 Age:

Kumar (2009) made an attempt to assess the existing level of job productivity of veterinary surgeons in making the Animal Husbandry Department Haryana more

beneficial for the dairy farmers and revealed that majority (46.00%) of the veterinary surgeons were belonging to middle age group.

Ratnayake (2012) conducted a study in eleven selected districts in Andhra Pradesh and found that 57.27 per cent of the VASs were belonging to young age group while only 1 per cent of the respondents hailed to old age category.

Goyal *et al.* (2018) conducted a study to assess the work stress perceived by 168 field veterinary functionaries selected from 4 districts i.e. Hisar, Karnal, Kurukshetra and Mahendergarh across Haryana and found that majority of VSs and VLDAAs were within the age group of 35-50 years (48.75 % and 43.75%) while two-third (75%) of the SDOs was old in age (more than 50 years).

2.2.2 Gender:

Ratnayake (2012) conducted a study and found that majority (77%) of the VASs in eleven selected districts in Andhra Pradesh, were male while only 23 per cent of the respondents were female.

Agrawal and Agrawal (2014) conducted a research to study the level of job satisfaction among the veterinary officers in Rajasthan and data collected in this empirical study relates to 150 veterinary officers, covering 138 male and 12 female officers.

Goyal *et al.* (2018) conducted a study to assess the work stress perceived by 168 field veterinary functionaries selected from 4 districts i.e. Hisar, Karnal, Kurukshetra and Mahendergarh across Haryana and found that male female ratio was extremely skewed in favor of males at all the levels, SDOs (100:0), VSs (92.50:7.50) and VLDAAs (100:0).

2.2.3 Level of education:

Ratnayake (2012) conducted a study in eleven selected districts in Andhra Pradesh and found that among all the Veterinary Assistant Surgeons 67 percent were B.V.Sc. & A.H. degree holder while remaining all the respondents were postgraduates and none were found to have doctoral degree.

Agrawal and Agrawal (2014) conducted a research in Rajasthan and data collected in this empirical study relates to 150 veterinary officers, covering veterinary officers on the basis of education level: 119 graduates and 31 postgraduates.

Goyal *et al.* (2018) conducted a study on 168 field veterinary functionaries selected from 4 districts i.e. Hisar, Karnal, Kurukshetra and Mahendergarh across Haryana and revealed that two-third of the SDOs (75.0%) was postgraduates, 90 % of

VSs were graduates and 10 % were post-graduates whereas cent percent (100%) of the VLDAs were holding diploma in Animal Husbandry without any post diploma education or degree.

2.2.4 Service experience:

Ratnayake (2012) observed that more than half (52%) of the VASs in eleven selected districts in Andhra Pradesh were in the medium category of service experience, while 27 per cent of them were in short experience category followed by 21 per cent of them were in high category.

Agrawal and Agrawal (2014) conducted a research study in Rajasthan and data collected in this empirical study relates to 150 veterinary officers, covering veterinary officers on the basis of length of service: 41 below 10 years, 71 between 10 to 20 years and 38 above 20 years.

Goyal *et al.* (2018) conducted a study to assess the work stress perceived by 168 field veterinary functionaries selected from 4 districts across Haryana and observed that the average years of service experience for SDOs, VSs and VLDAs were 25.6, 16.3 and 17.0 years, respectively.

2.2.6 Participation in training:

Kumar (2009) conducted a study to know the extent of fulfillment of targets by veterinary surgeons in Haryana and revealed that quantitative job productivity of veterinary surgeons of four districts was found more than 100 per cent in area like “training attended at Haryana Veterinary Training Institute, Hisar” (102.50%).

Sandika (2006) reported that majority (66%) of veterinary officers and VLIs of Department of A.H. and veterinary services in Belgaum district of North Karnataka, were not exposed to any type of training.

Ratnayake (2012) conducted a study in eleven selected districts in Andhra Pradesh and found that majority of veterinary assistant surgeons had received 2-4 trainings followed by 15 per cent of VASs had participated in 4-7 training programmes while 11 percent were exposed to only one training programme and 9 per cent had not received any training.

2.3 Concepts of zoonoses:

Porter (2013) stressed that the configuration of zoonosis involves ‘how humans should conduct themselves in the name of an existence they share with other

species', such constitution of a 'threatening intimacy' (137) is already always conditioned upon hierarchical configurations of human-to-human relations.

Brown and Kelly (2014) and Narat *et al.* (2017) argued that over the years, the implication of animals as sources of human disease has generated complex patterns of problematisation of human-animal contact and entanglement.

Keck and Lynteris (2018) stated that notions of local knowledge taken from ethnozoology are thus reactivated in the wake of the challenges raised by zoonoses, raising new questions about the modes of agency of pathogens transmitted from animals to humans.

2.4 Knowledge of respondents regarding zoonotic diseases:

Munyeme *et al.* (2010) in a study investigating the epidemiological characteristics of bovine tuberculosis in Zambian cattle in relation to awareness by cattle owners in high and low cattle bovine tuberculosis prevalence settings revealed that 60.40 per cent of the cattle owners had not heard of bovine tuberculosis, or tuberculosis in animals. The cattle owners who had heard of tuberculosis in animal, only 7.00 per cent had an idea on how the disease spread with 92.90 per cent having no basic knowledge of its spread. Awareness of tuberculosis was associated with the experience of animal possession.

Addo (2011) conducted a study to assess knowledge, Attitudes and Practices of herdsmen in Ghana with respect to milk-borne zoonotic diseases and the safe handling of milk. He reported that majority of the respondents had awareness of TB (88.00%) and brucellosis (76.00%) but only 2.70 per cent and 1.80 per cent of them were with awareness about correct cause of TB and brucellosis respectively. Most of respondents did not know how humans could contract TB (66.00%) and brucellosis (87.00%) from cattle and 31.00 per cent did not know that boiling of milk can prevent milk borne diseases.

Praveenchandra and Praveenchandra (2013) conducted a study on a random sample of 120 respondents, selected from Anand district of Gujarat to assess the knowledge of dairy farmers about important ten zoonotic diseases and adoption of practices to prevent zoonotic diseases and found 100.00 per cent of farmers practicing dairy farming had knowledge that veterinarian should be called for treatment of animals within 24 hours of onset of symptoms, animal sheds should be regularly disinfected, care should be taken while handling and disposing foetus, placental

membrane and uterine discharge to prevent zoonotic diseases, hygiene on farm should be taken care of to prevent zoonotic infections, animal excreta and other materials should be disposed properly to prevent zoonotic diseases, tetanus can be prevented in animals and man by active immunization, FMD in animals can be prevented by vaccination, animal movements should be controlled to prevent spread of zoonotic diseases and post bite vaccination in animals and man can prevent rabies.

Chikerema *et al.* (2013) conducted a cross sectional study in rural communities of 7 districts in Zimbabwe to assess cattle owner's awareness, perception, and attitude toward zoonoses, with particular emphasis regarding Anthrax and reported that overall, the level of awareness amongst the farmers for zoonoses was rabies (88.70%), anthrax (71.50%) and brucellosis (20.90%). Farmers from anthrax high risk districts were significantly more aware of anthrax as compared to those from moderate and low risk districts. All of farmers were aware about anthrax occur in cattle, and 73.00 per cent indicated the presence of unclotting blood oozing from natural orifices as consistent finding in cattle that died of anthrax, where 86.70 per cent of them indicated the presence of skin lesions as the most common sign of disease in humans.

Soni *et al.* (2014) conducted a study to know opinion of farmers about information on Animal Husbandry practices given during Krishi Mahotsav and revealed that during Krishi Mahotsav programme, 85.00, 77.00, 72.00 and 70.00 per cent of the farmers gained information about contagious diseases of animals, importance to clean the udder before milking, need for vaccination/age of calf to give foot & mouth vaccine/name of month of vaccine for foot and mouth disease and vaccination schedule for buffalo-cow/month for vaccine for HS disease respectively.

Babu *et al.* (2015) conducted a study to assess the awareness of zoonotic diseases in farmers, agricultural workers, butchers, students and in employees of state government and private organizations. Study revealed that among the respondents only 28.06% were having some awareness about zoonotic diseases. All the participants of this study knew about the dangerous zoonotic diseases i.e. rabies (100%) and this was followed by bird flu (25.89%) and swine flu (18.58%).

Hundal *et al.* (2016) conducted a study based on data collected from livestock farmers who visited the Guru Angad Dev Veterinary and Animal Sciences University from different districts of Punjab to assess the awareness, knowledge, and risks of zoonotic diseases among livestock farmers in Punjab and came to the result that about

69.2 per cent respondents belonged to low to medium knowledge level categories, whereas 30.8 per cent respondents had high knowledge ($p < 0.05$) regarding different aspects of zoonotic diseases.

Munisamy *et al.* (2017) conducted a study in 100 dairy farmers in Peralambur district of Tamil Nadu State to study the awareness, risk factors of cattle zoonotic diseases, impact in human and animal population and observed that 74 per cent and 77 per cent dairy farmers are aware about deworming and zoonotic diseases respectively.

Kumar and Prakash (2017) conducted a study in Uttar Pradesh state where 120 dairy farmers (60 CMP and 60 N-CMP) from the milk shed area of four districts milk union were selected. The results of the study revealed that 71.67 and 61.67 per cent of the dairy farmers had medium level of knowledge in various aspects of CMP and N-CMP followed by 10 and 25 per cent had low level of knowledge while, 18.33 and 13.33 per cent of them having high level of knowledge, respectively. They had highest knowledge in milking [Knowledge index (KI) = 75.41 and 68.45], followed by healthy herd management (KI = 66.84 and 61.54). However, they had poor knowledge in 'cooling of milk (KI = 56.66 and 51.12) and 'cleaning of utensils (KI = 58.22 and 54.58) in CMP and N-CMP, respectively.

Sarita *et al.* (2017) conducted a study in Murrah tract of Haryana state to assess the knowledge of dairy farmers about improved buffalo health care practices and observed that only 3.6 per cent of them knew that animal house should be disinfected while 29.6 and 33.6 per cent of them were having knowledge regarding zoonosis through animals and milk, respectively.

Chowdhury *et al.* (2018) conducted a study to assess the knowledge, awareness and risks of zoonotic diseases among the smallholder livestock farmers of the suburban areas in Sylhet region with a small data set of 23 farmers and found that only 47.83% of these farmers were aware and do have knowledge regarding the causes and transmission process of different zoonoses.

Singh *et al.* (2019) conducted a study on livestock (cattle/buffalo/sheep/goat/pig) farmers residing in the rural areas of Punjab to understand knowledge, attitude and practices of livestock farmers regarding zoonoses and reported that of the 859 participants, 685 (80%) livestock farmers had heard the term 'zoonoses' but only 345 (40%), 264 (31%) and 214 (25%) farmers were aware of the zoonotic nature of tuberculosis, Japanese encephalitis and taeniosis, respectively.

2.5 Communication behavior of respondents:

Bordoloi *et al.* (2004) conducted a study on communication behaviour of extension personnel, in two districts of Assam, one district representing progressive and another non progressive and revealed that about 50 per cent of the respondents in both progressive and non progressive districts had 'medium' level of communication behaviour followed by 'high' (36.73%) and 'low' (10.20%). Comparatively more respondents (37.50%) in progressive district showed 'high' level of communication behaviour than non-progressive district (28.00%).

Prasad *et al.* (2009) conducted a study in Jind district of Haryana and revealed that significant proportion of the dairy farmers retained the information by practicing in daily life (93.33%) followed by informing family members (76.67%) and memorizing (64.17%). The dairy farmers were evaluating information by discussing with progressive farmers, family members, neighbour/friends and extension officer. Most common parameters used for appraisal of information were profitability, method of doing, availability of input and observability.

Brennan and Christley (2013) studied attitudes and behaviours of producers relating to selected biosecurity practices and the farming industry by interviewing cattle farmers within a 100 km² study area in north-west England using an interview-based questionnaire. In their study they found that most producers sourced biosecurity information from government (46%, n = 26), followed by private vets (41%, n = 23) and press/farming press (18%, n = 10). Five farmers (9%) each indicated that they sourced information from farm assurance advisors, and believed biosecurity was a case of common sense/general knowledge.

Tebug (2013) conducted a study designed to determine factors associated with dairy producer's awareness and practices with regard to zoonoses in Northern Region of Malawi and concluded that more than half of the respondents received information about zoonotic diseases from agricultural extension workers.

Kavithaa *et al.* (2014) conducted a study on information seeking behavior of the dairy farmers in Erode District of Tamilnadu and observed that majority of the dairy farmers (52.86%) belonged to medium category with respect to level of information seeking behavior followed by high (31.43%) and low (15.71%). Thus, the majority of the dairy farmers had medium to high level of information seeking behavior.

Khuman *et al.* (2014) carried an investigative study regarding “Attitudinal and motivational traits on communicational behaviour of tribal and non-tribal dairy farmers” among fifty each tribal and non-tribal dairy farmers in four dairy dominated development blocks of Cachar district of Assam and revealed that, among tribal and non-tribal farmers attitude towards dairy farming, economic motivation and source of motivation for dairy communication were found to have favourable scores with positive and significant correlation with communication behaviour. Regression analysis revealed that source of motivation for dairy communication crucially influenced communication behaviour of dairy farmers. Further, there loud significant difference between the tribal and non-tribal dairy farmers indicating sensitive strategies for dairy development in the area involving the veterinarians.

Bhanotra *et al.* (2016) conducted a study in Kathua district of Jammu and Kashmir state to find out the of socioeconomic status of the dairy farmers and revealed that majority of dairy farmers belonged to medium socio-economic status and had medium information source utilization pattern. The main source of information was the radio followed by television which was frequently used by the farmers. The reach of extension contact to remote villages of the state was found to be low.

Rakesh *et al.* (2016) conducted a study on 160 dairy farmers selected from 12 villages of Hisar and Jind districts of Haryana and found that majority (58.13%) of dairy farmers were having medium level of information seeking behaviour and remaining 26.25 and 15.63 per cent of them had low and high level of information seeking behaviour, respectively.

Singh *et al.* (2016) conducted a study to ascertain the information needs and seeking behaviour of dairy farmers of Punjab state and study revealed that 70.58% farmers needed information on different subsidy schemes of the Government, followed by 70% on feed and fodder and 64.70% on animal breeding. About 89.21% farmers met their information needs from Pashu Palan Mela and animal welfare camps, and 85.29% got needed information from television and newspapers.

Thorat *et al.* (2016) conducted a research study on communication behavior of tribal dairy women in animal husbandry in Dahod district of Gujarat state and revealed that less than three-fifth (57.00%) of the tribal dairy women made their contact with relatives and 45.00 per cent of them made contact with progressive farmers., Majority of the TDW had medium level of extension contact and extension

participation. 37.00 per cent of the tribal dairy women participated in Krushimela while 24.00 per cent of respondents had participated in training programme related the animal husbandry.

Vekariya *et al.* (2016) conducted a research study in Junagadh and Gir Somnath districts of Saurashtra region and found that two-third (66.67 %) of the Maldhari dairy farmers used medium sources of information, whereas 23.33 per cent and 10.00 per cent of them used less and more sources of information, respectively.

Gangil *et al.* (2019) conducted a study in five district of Punjab i.e. Ludhiana, Barnala, Bathinda, Tarn- Taran and Hoshiarpur to assess information needs of dairy farmers and observed that most essential information needs were knowledge about infectious diseases (INI=89.00), prevention and control of mastitis (INI=86.33), identification of reproductive disorders (INI=83.00), concentrate formulation (INI=83.00), Timely heat detection (INI=81.67), control of ecto-parasite (INI=81.67) and knowledge about credit facilities (INI=81.67). Out of total areas health care perceived as most priority area (INI=78.33) followed by breeding (INI=74.67), feeding (INI=71.00), management (INI=68.00) and marketing (INI=66.33).

2.6 Milk production practices

Pandey and Meena (2013) conducted an exploratory Interview- schedule based study of livestock owners (n=120) in Basti and Gorakhpur Districts of Uttar Pradesh, to assess control measures followed by livestock owners with respect to zoonotic diseases and results indicated that majority of respondents (95.00%) clean animals shed regularly followed by check their animals (90.00%) regularly, concerned with para veterinarians (87.50%) regularly, clean teat (77.50%) before and after milking and prevent animals overcrowd, avoid eat /drink in animal (75.00%) shed area. Respondents (43.33%) clean their animals regularly, use of mosquito (26.67%) coil, discussion with veterinarians (21.67%), maintain proper drainage (20.83%) home as well as animals shed, regular vaccination (16.67%) for their animals and none of respondents clean their hand with soap or dettol after animals handling.

Singh and Singh (2013) conducted a study based on data collected from randomly selected 120 dairy farmers in Senapati district of hill region of Manipur and revealed that among the six recommended improved healthcare practices, only two statements viz., isolation of sick animals from the healthy one and timely and regularly vaccination against contagious diseases - Haemorrhagic Septicaemia, Black

Quarter, Foot and Mouth Disease, Anthrax, Brucellosis were adopted by 98.33 per cent and 88.33 per cent respectively whereas; the remaining practices were adopted by very few farmers. It is also clear that the lowest (3.33%) adoption was about practicing deworming in calves. Moreover, majority of the respondents (74.17%) did not adopted prompt reporting of outbreak of epidemic to the local veterinary doctor (74.17%) and ‘treatment of sick animals by veterinary doctors (66.67%).

Babu *et al.* (2015) conducted a study and observed that hygienic practices followed by the farmers during cleaning of udder while milking and during cleaning of sheds were considered to be negligible. 8.46% of the respondents owned dogs and among them 58.33% of them feed their dogs with raw offal and 66.67% of them allow their dogs freely in their premises.

DeSilva and Kalubowila (2015) conducted a survey to identify common health problems in cattle and to study the various traditional veterinary practices (TVP) used by cattle farmers in Sri Lanka. They observed that 42 % of the surveyed farmers use TVP and they do not rely on orthodox veterinary medicinal treatment. About 10 % of farmers combined both traditional and orthodox veterinary services as source of cattle disease treatment. It was observed that different indigenous methods such as medicinal preparations, inhalation, burning of vital points (moxibustion) and praying for gods were used to treat cattle diseases. TVP were widely used by cattle farmers (10%) to treat internal parasites while 38% of farmers to control external parasites.

Hundal *et al.* (2016) conducted a study and observed that livestock farmers from different districts of Punjab not only disposed off the infected placenta (35.6%), aborted fetus (39.6%), or feces (56.4%) from a diarrheic animal but also gave intrauterine medication (23.2%) bare-handedly. About 3.6-69.6% respondents consumed uncooked or unpasteurized animal products.

Sarita *et al.* (2017) conducted a study in Murrah tract of Haryana state to assess the knowledge of dairy farmers about improved buffalo health care practices and observed that majority (67.6%) of respondents were not having any idea whereas 32.4 per cent of them knew about timely and regularly deworming of buffalo and in addition to this, about 47.2 per cent of dairy farmers were familiar with this fact while 52.8 per cent of dairy farmers didn’t know that aborted foetus and discharge should not be handled with bare hands.

Yilma Kidane (2003) conducted survey to study the hygienic handling and the microbial quality of dairy products and observed that sanitary measures taken by the actors at different stages of the dairy chain were substandard. 40 and 58 per cent of small- and large-scale producers respectively used collective towel or nothing and 47 per cent and 33 per cent of them respectively used river and/or bore hole water with or without treatment for cleaning the udder and milk utensils.

Vaidya (2016) conducted a study on the adoption of different package of practices for dairy animals in four talukas namely Bavla, Sanand, Ahmadabad city taluka and Dholka of Ahmadabad district and reported that 94.00 per cent of respondents washed the udder and teats before milking, use properly cleaned utensils for milking, sale the milk immediately, 86.00 per cent respondents followed regularity of milking operation in terms of time interval, place and person, filtered milk with clean, dry cloth and tightly covered container and kept in cool place, 70.00 per cent and above of the respondents were followed quick and complete milking in noise free environment and removed 1st 2 to 3 strips of milk from each teat to reduce bacterial load in milk. Nearly three fifth (59.00%) of the respondents were washed and dried the hand before milking and milked the sick and under treatment animals at last and kept its milk separate. More than one third (35.00%) of the respondents were cleaned and washed the floor before milking. 30.00 percent and 24.00 per cent of the respondents were used dome shaped stainless steel utensils for milking and used face mask and trimmed their nails, respectively. Only 6.00 per cent and 3.00 per cent of the respondents were followed full hand milking method and washed the teats after milking.

Vahora et al. (2016) conducted a study in operational area of Pashu Vigyan Kendra, Limkheda Anand agricultural university of Dahod district of Gujarat state to know the involvement of tribal dairy women in health care management practices of animal husbandry and reported item wise participation related to health care hierarchy, Care of sick animal rank first with mean score 2.43 followed by care of pregnant animals (2.31), care of new born (2.27), taking animal for treatment (2.15), taking animal for vaccination (2.03), purchase of vet. medicine (1.42), deworming (1.41) and disposal of carcass (1.25) with rank II, III, IV, V, VI, VII and VIII, respectively.

Kashongwe *et al.* (2017) conducted a study and observed that udder drying was only applied in peri-urban herds (100%). Milking was shorter in pastoral herds than in smallholder herds (5 vs. 10 min). In all the sample herds, post milking hygiene

was not a practice and mostly used plastic containers for milking. Pooling of milk in pastoral herds was in plastic containers, while aluminum containers were common (62.5%) in peri-urban. Either of the containers was used in rural farms (50%).

Marufatuzzahan et al. (2018) conducted a study to explore the prevailing animal husbandry and hygiene practices among the small-scale livestock farmers of suburban area of Sylhet, Bangladesh and revealed that 100% of the farmers maintain a healthy manner of regular animal shed cleaning and hand washing practices. Most of the farms are located with well drainage system (87%) and a majority of them (82%) follow the practice of udder cleaning. The response about animal shed location and clean water access for animals left this survey with a great concern. Only 47.8% of the farms had arrangement of clean water for animals. Almost same number of farmers mentioned about having no different animal shed. Their answers were calculated to make a score list where the least score was 3 with a higher risk of health hazards. Most of the farmers scored 5 and a few with a full score (6) for good hygiene practice. 34.8% of the farmers got only 4 marks and this is remarkably bad condition of hygiene.

Singh et al. (2019) conducted a study to understand knowledge, attitude and practices of livestock farmers regarding zoonoses in the rural areas of Punjab and found that 23% farmers reported consumption of raw milk and only 10% and 8% livestock farmers ever got their animals tested for brucellosis and tuberculosis, respectively.

2.7 Concepts of Animal Hygiene

Saloniemi (1997) described animal hygiene as the knowledge of which is based on several “basic sciences” such as microbiology, epidemiology, ethology, immunology, clinical chemistry etc. And, because one is working with animal health, one needs good knowledge in veterinary medicine as a whole.

Esuruoso (1998) reported that animal hygiene subjects include in their course contents attainment of farm structures and environmental conditions that prevent outbreaks of diseases, and maintain the well being of both animal and man in a farm environment.

Tielen (2000) defined Animal hygiene as animal health care practice that includes each form of interaction between abiotic and biotic factors of environment and the domestic animal in its strategies to prevent diseases, to promote animal health, and to ensure that species-specific as well as age specific welfare needs of such animals are met - especially food animals.

Olugasa (2001) stated that animal hygiene is founded on biostatistics because it deals with population of animals and test of associations with other biotic and abiotic factors in the external environment.

Olugasa *et al.* (2003) stated that the definition of animal hygiene explains in clear terms, the composition and integration of subjects presented in veterinary public health and preventive medicine courses in Ibadan. Thus, one may conclude that veterinary public health and preventive medicine is the study and practice of animal hygiene. This is capable of enriching the comprehension of the subject.

Blaha (2007) defined “Animal Hygiene” as the discipline of veterinary medicine that is not focussing at animal disease, but on animal health.

Hartung and Schäffer (2007) described animal hygiene as Preventive Medicine, it stands opposite of Curing Medicine. The overall aim of animal hygiene is to keep animals, farm animals and companion animals, healthy and protect them from all factors that can impair their health, well-being and production. It is a holistic approach preventing disease and discomfort instead of curing. This approach is not limited to typical food delivering animals such as cattle, sheep and pigs, it applies also to domestic and companion animals like horses, ferrets or falcons.

2.8 Attitude of veterinary professionals towards animal hygiene

Grant and Olsen (1999) surveyed physicians and veterinarians in Wisconsin about the risk for and prevention of zoonotic diseases in immune compromised persons. They found that physicians and veterinarians hold significantly different views about the risks posed by certain infectious agents and species of animals and communicate very little about zoonotic issues; moreover, physicians believe that veterinarians should be involved in many aspects of zoonotic disease prevention, including patient education.

Lipton *et al.* (2008) conducted a survey with an objective to determine the extent to which practicing veterinarians in King County, Washington, engaged in commonly recommended practices for the prevention of zoonotic diseases. A high proportion (280/362 [77%]) of respondents agreed that it was very important for veterinarians to educate clients on zoonotic disease prevention, but only 43% (158/367) reported that they had initiated discussions about zoonotic diseases with clients on a daily basis, and only 57% (203/356) indicated that they had client educational materials on zoonotic diseases available in their practices. Thirty-one

percent (112/360) of respondents indicated that there were no written infection control guidelines for staff members in the practice, and 28% (105/371) reported having been infected with a zoonotic disease in practice.

Kumar (2009) conducted a study to analyze job productivity of veterinary surgeons posted at civil veterinary hospitals in the Department of Animal Husbandry and Dairying, Haryana and reported that majority of the respondents (65.00%) were having neutral attitude towards animal husbandry followed by favourable (18.00%) and unfavourable attitude (17.00%).

Swai *et al.* (2010) conducted an exploratory questionnaire-based survey of animal health workers(n=36) and livestock keepers (n=43) in Tanga and Arusha regions, northern Tanzania, to assess local knowledge, attitudes and public awareness for animal zoonoses and reported that there was a significant difference in the perception of the risk posed by contact with potentially infected animals /or animal products with animal health workers having a much higher level of perception compared to livestock keepers.

Malik *et al.* (2012) in a study entitled “Emergence and re-emergence of glanders in India: a description of outbreaks from 2006 to 2011” reported that delays in reporting by veterinary professionals is one among the important social reasons that pose a challenge to disease control.

Dowd *et al.* (2013) conducted a study in which respondents were asked about the factors that discouraged or encouraged use of personal protective equipment (PPE), some of the respondents identified deterrents to PPE use such as absence of perceived risk or attitudinal reasons, performance issues when wearing PPE gear (e.g. poor visibility) and availability of PPE gear. Of the factors that encouraged use of PPE, perceived risk to self was identified as the most likely reason to encourage use of PPE (68.8%), followed by professional experience with previous zoonotic cases (56.7%), liability issues (40.7%) and recommendations of industry guidelines or standard operating procedures (37.5%).

Levine *et al.* (2005) conducted a study on veterinary students at Cornell University with regards to students’ perceptions of the cognitive abilities of six different domesticated species and reported that students aspiring to work with food animals considered more procedures to be humane for all species than did students

aspiring to work with small animals. The inconsistency of students' attitudes for different species has implications for veterinary education and animal welfare.

Weijden (2013) conducted a study to evaluate the attitudes towards the use of animals of students enrolled in animal welfare and laboratory science courses in the Netherlands and reported that students are more concerned about how an animal is being treated. Statistics were done with significance set at $p < 0.05$. Attitudes towards Pets (85.5%) were significantly higher than those towards Pest, Profit and Laboratory animals (73.7% vs. 60.9% and 59.2%, respectively) and almost comparable attitude scores on the Profit and Laboratory animal subscales were found.

Ali (2015) conducted a study in Sawakin veterinary quarantine, Eastern Sudan, to assess local knowledge, attitudes and public awareness of animal health workers for animal zoonoses and observed that there was no significant difference in the attitude among different age and educational groups, but it was observed that the educated workers had good practice to prevent themselves from the diseases in contrast to other groups, in Sawakin veterinary quarantine, Eastern Sudan.

Horo and Chandel (2018) conducted a study on Constraints in Crossbreeding Programme and Technology in 12 villages of Khunti and Hazaribagh districts of Jharkhand and reported that lesser visits (irregularity) of veterinary doctors in the area was one of the major technical constraints identified.

Pirrone *et al.* (2019) administered a survey eliciting information about demographics, knowledge, experience, and perceptions regarding different categories of animals, and including the Animal Attitude Scale (AAS), to undergraduate veterinary medicine students in three Italian universities and found that veterinary students showing pro-animal welfare attitudes (mean score = 64.20 \pm 0.24 out of 100 with a good Cronbach's alpha score of 0.81).

CHAPTER-III

MATERIALS AND METHODS

Research methodology constitutes one of the most important parts of scientific enquiry. A systematic approach conforming to scientific principles and procedure must be followed to arrive at valid and reliable results. This chapter on research design describes the procedural steps followed during the course of study. The methodological steps followed in the study are described under following heads:

3.1 Research Design

3.2 Selection of locale

3.3 Selection of respondents

3.4 Selection of variables and their measurement

3.5 Collection of data

3.6 Analysis of data

3.7 Interpretation of results and report writing

3.1 Research Design

The basic purpose of this investigation was to assess the knowledge of respondents about prevention of zoonotic diseases. Since change in knowledge as well as antecedent characteristics of dairy farmers have already taken place and the investigator has no control in any way, *ex-post facto* research design was adopted in this study.

3.2 Selection of locale

The present study was conducted in Haryana state which is situated between 27° 39' to 30° 55' N latitude and 74° 27' 8" to 77° 36' 5" E longitude. There are 22 districts in the state, out of which two districts namely Hisar and Jind were selected on the basis of highest concentration of cattle and buffalo as the availability of respondents would not have been a problem. These two districts were chosen for the ease of researcher in data collection. In fact, the population of cattle and buffalo in Hisar district is 6,53,630 (1,67,576 cattle and 4,86,057 buffalo) and 6,22,864 (1,20,926 cattle and 5,01,938 buffalo) in Jind district, respectively. Therefore, total population of these districts is 12, 76,494 out of the total population of 75, 05,589 of the Haryana state which constitutes about 17 percent of the state (Anonymous 2012).

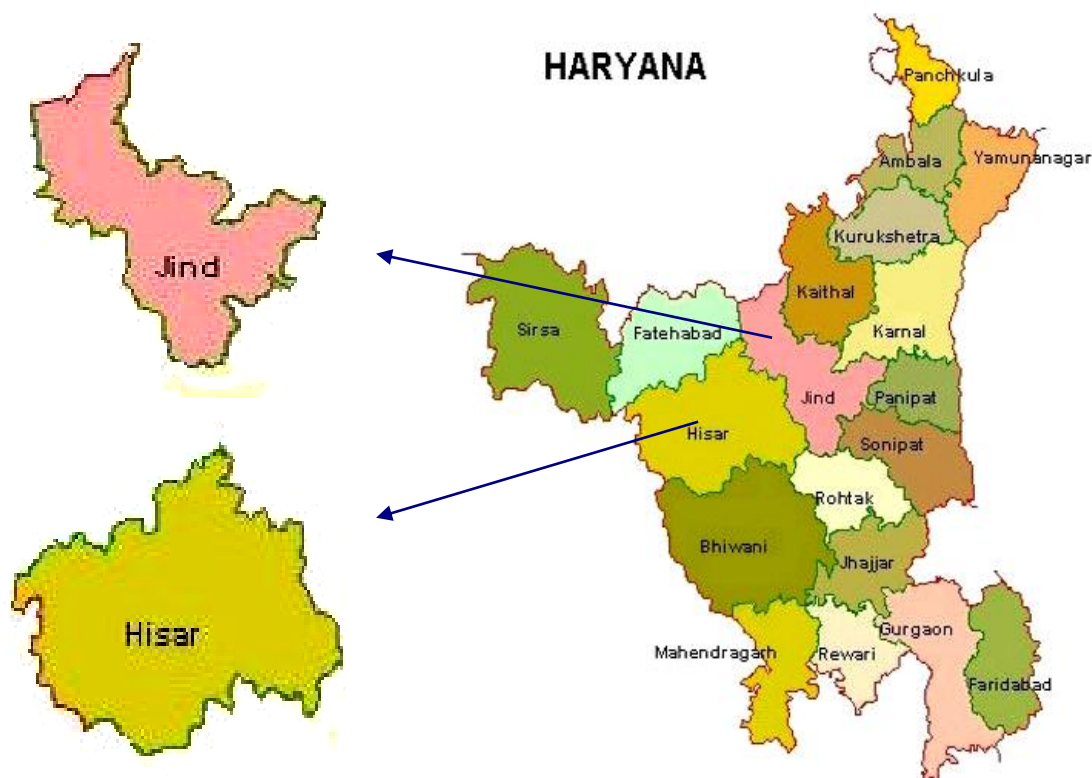
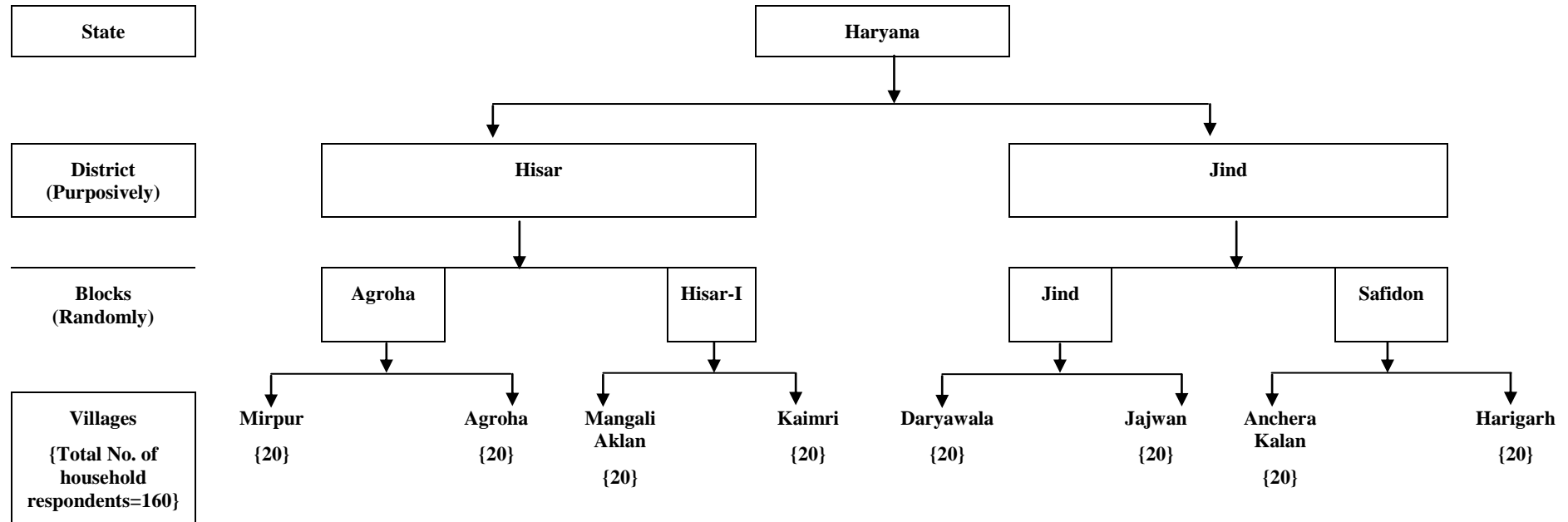


Fig 1: Map of Haryana State showing the location of the districts selected for the investigation

3.3 Selection of respondents

Multistage random sampling technique was used. There are nine blocks in Hisar district and seven blocks in Jind district. Two blocks from each district were chosen randomly using simple lottery method. Further, for selection of respondents, two villages were again selected from each block randomly. In this way, 8 villages were selected from both the districts. All those villagers who were keeping cattle/buffalo were considered respondents for the study. Village wise list of such owners was prepared and 20 dairy farmers from each village were then selected randomly. These were considered as household dairy farmers. In this way, a total of 160 dairy farmers constituted the sample for the study. Similarly, a list of peri-urban dairy farmers engaged in commercial dairying in the periphery of urban areas of district headquarter was prepared for both the districts in consultation with the local veterinarians. These were considered as peri-urban/commercial dairy farmers. Thereafter, 10 commercial dairy farm owners from each district were selected randomly. Finally, 34 veterinary professionals from each district were chosen randomly using simple lottery method.

SAMPLING FRAME WORK



Eighty household dairy farmers from each district comprising a total sample of one hundred and sixty (160) dairy farmers as respondents for the proposed study.

Fig. 2: Selection of respondents



Fig 3: Researcher holding personal interview for collecting data

3.4 Selection of variables and their measurement

A variable is something which varies. More specifically, variables are those attributes of objects, things and beings which vary and can be measured. In other words, variables are the characteristics or conditions that can be observed, manipulated or controlled by the researcher (Ray and Mondal, 2011). Technically speaking, measurement is a process of mapping aspects of a domain onto other aspects of a range according to some rule of correspondence.

Generally, in social sciences variables are of two groups i.e. independent and dependent. After thoroughly screening the available past studies and researches concerning the present investigation and discussion with experts, 13 important independent variables reflecting the socio-economic, psychological and communication attributes of the respondents were included in the study. The operational definition of these variables and the details of measurement techniques followed are given below:

3.4.1 Independent variables

3.4.1.1 Independent variables (Dairy Farmers)

The antecedent variables likely to affect knowledge of dairy farmers about prevention of zoonotic diseases and communication behaviour were selected after a thorough review of available literature. Following independent variables were included in the study and operationalized:

Age: It referred to chronological age of respondents in years at the time of data collection. It was measured as numbers of completed years by direct questioning of

the respondents. The respondents were categorized into three age groups i.e. young (18-30 years), middle (31-55 years) and old (56-83 years) for the analysis.

Education: It referred to the academic qualification of the respondents acquired through formal schooling. It was measured using the scale developed by Trivedi (1963). The responses were obtained by direct questioning and scoring was done in the following manner:

Educational Category	Score
Illiterate	0
Can read only	1
Can read and write	2
Primary	3
Middle	4
High school& 10+2	5
Graduate and above	6

Experience in dairy farming: It was operationalized as the number of years the respondents had completed as dairy farmers at the time of data collection. It was measured in years and responses were obtained by direct questioning. The respondents were categorized into three groups using equal class interval method, as low (<21), medium (21-39) and high (>39) and expressed in terms of years.

Type of Family: Respondents were asked to state their family status i.e. nuclear or joint. Nuclear family was taken as when a respondent was living with his wife and children, whereas joint family was considered as where all the adult brothers along with the parents were residing in the same house and sharing common resources. The scores were awarded as indicated below:

Categories	Score
Nuclear family	2
Joint family	1

Social participation: It refers to the degree to which a respondent was associated with different social organizations (formal or informal) like village panchayat, panchayatsamiti, rural clubs, zilaparishad, religious committee and cooperative society, as a member or office bearer. It was measured by using the scale developed by Trivedi (1963). The scoring pattern followed was:

Categories	Score
No member	1
Member of one organization	2
Member of more than one organization	3
Office holder	4
Wide public leader	5

Mass media exposure: The mass media exposure was operationalized as frequency of exposure and use of different mass media like leaflet/ pamphlet, farm magazines, newspapers, books on agriculture, radio, television, video/film show etc. for getting information of animal husbandry by the respondents.

The different mass media sources were listed and the respondents were asked to indicate as to how often they are exposed to each of these sources. The procedure suggested by Byra Reddy (1971) was used in assigning weightages as detailed below. The respondents were asked to give their reply on three-point continuum viz., regular, occasional and never utilized and scores of 2, 1 and 0 were assigned to these responses, respectively. Thus, the minimum and maximum possible obtainable overall scores were 0 and 14, respectively. The total score of each individual on this variable was worked out by adding the scores of each item. The respondents were categorized into low, medium and high mass media exposure by equal class interval method.

S. N.	Media	Extent Media of exposure		
		Regular	Occasional	Never
1.	Leaflet/ pamphlet on agric.			
2.	Farm magazines			
3.	Newspapers			
4.	Books on agriculture			
5.	Radio			
6.	Television			
7.	Video/film show			

Caste: It referred to the class as distinct hereditary order in the society. Scores were assigned to different caste groups as follow:

Category	score
SC/ST	1
OBC	2
General	3

Land holding: It was defined as the units of land in acre/hectares in possession with the family of the respondents. It was operationalized using the socio-economic scale developed by Pareek and Trivedi (1964). The scoring pattern followed was:

Categories	Score
Landless	0
Less than 1 acre	1
1 to 5 acre	2
6 to 10acre	3
11 to 15 acre	4
16 to 20 acre	5
More than 20 acre	6

Herd size: It refers to the number of dairy animals possessed by the respondent at the time of interview. In the present study, the herd size was categorized into three classes- small, medium and large. Following scoring pattern was adopted:

Categories	Score
Small (1-2)	1
Medium (3-5)	2
Large (Above 5)	3

Extension participation: Extension participation was defined as the degree to which an individual participates in various non-formal educational activities including individual, group and mass contact methods in order to obtain new information, knowledge and skills related to animal husbandry.

It was measured with the help of the scale developed by Siddaramaiah and Jalihal (1983) with minor modification. The total score of each individual on this variable was worked out by adding the scores of individual statements. The respondents were categorized into three groups viz., low, medium and high having equal class interval method.

Risk orientation: It referred to the capacity of farmer to bear the risk and face uncertainty in the dairy farming. It was operationalized using the scale developed by Patel (2009) with minor modifications. The scale contained 10 items. The responses were obtained on five-point continuum and the score ranged from 10 to 50. The scoring procedure is indicated below:

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
For +ve statements	5	4	3	2	1
For –ve statements	1	2	3	4	5

Risk orientation scale

Sr. No.	Risk orientation	SA	A	UA	DA	SDA
1	I am confident on my ability to take challenges for any type of risk in dairy farming					
2*	I don't like to use any risk creating methods in dairy farming					
3	I am ready to bear risk in dairy farming for high profit					
4	I like to take challenge in adopting costly methods in dairy farming					
5*	I like to follow only those methods which are successfully accepted by others farmers					
6	I feel people with in tented risk bearing capacity are always stepping the top					
7*	I feel fear that something unexpected might damage my plans of adopting new technology in dairy farming					
8	I can minimize the consequence of risk in dairy by proper planning					
9	I can reduce the effect of any risk in dairy farming by proper execution					
10	I feel that accepting realistic risk in dairy is not always hazardous resolution					

(*=-negative statements)

Scientific orientation: It was operationally defined as the degree to which a dairy farmer is oriented towards the use of scientific method in dairy farming practices. This variable was quantified by using the scientific orientation scale developed by Patel (2009) with minor modification. The scale contained 14 items. The responses were obtained on five-point continuum and the score ranged from 14 to 70. The scoring procedure is indicated below:

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
For +ve statements	5	4	3	2	1
For –ve statements	1	2	3	4	5

Scientific orientation scale

Sr. No.	Statements	SA	A	UN	DA	SDA
1*	Scientific methods of dairy farming always confuse me.					
2	Quality production in dairy farming is possible through use of science.					
3*	Adoption of new scientific dairy farming methods is problematical process.					
4*	Scientific methods of dairy farming are very impractical.					
5	Profitable dairy farming production is possible through intervention of science and technology.					
6*	Application of science in dairy farming means wastage of time.					
7	I like to prefer scientific methods of dairy farming.					
8*	I believe in traditional method of dairy farming.					
9	In my opinion use of science in dairy farming means fruitful result.					
10	Sustainable dairy farming is possible through application of science.					
11	Scientific dairy farming methods increase production.					
12*	Scientific dairy farming methods damage ecology.					
13	Scientific dairy farming methods require high infrastructural facilities.					
14	Application of science in dairy farming means savings of money.					

(*=-negative statements)

Economic motivation: It referred to the occupational success in terms of profit maximization and the relative value placed by one on economic ends (Supe, 1969). In the present study, it was operationalized with the help of scale developed by Supe (1969). The scale contained 6 items. The responses were obtained on five-point continuum.

S No.	Statement	A	UD	DA
a)	A dairy farmer should work towards more milk yield and economic profits.			
b)	The most successful dairy farmer is one who makes the more profit.			
c)	A dairy farmer should try any new idea, which may earn him more money.			
d)	A dairy farmer should keep crossbreed cows/ improved buffaloes to increase monetary profits.			
e)	It is difficult for the dairy farmer's children to make good start unless he provides them with economic assistance.			
f)	A dairy farmer must earn his living but the most important thing in life cannot be defined in economic terms			

Statements 'e' and 'f' are negative. The scoring procedure of economic motivation is indicated below:

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
For +ve statements	5	4	3	2	1
For -ve statements	1	2	3	4	5

3.4.1.2 Independent variables (veterinary professionals)

The antecedent variables likely to affect veterinary professionals' attitude towards animal hygiene were selected after a thorough review of available literature. Following independent variables were included in the study and operationalized as indicated:

Age: It refers to chronological age of respondents in years at the time of data collection. It was measured by direct questioning of the respondents. The respondents were categorized into three age groups i.e. young (< 36 years), middle (36-48 years) and old age group (> 48 years) for the analysis.

Gender: It is the state of being male or female. But this state of being male and female makes difference in our behavior. In fact, Urdy (1994) defines gender as relationship between biological sex and behavior. Similarly, Wikipedia defines gender as the range of characteristics pertaining to, and differentiating between, masculinity and femininity (Wikipedia²). The respondents were asked to indicate male or female in the questionnaire.

Level of education: It refers to academic qualification of the respondents. Professionals were asked to indicate their highest degree like Graduate (i.e. B.V.Sc. and A.H.) or Post graduate (i.e. M.V.Sc. or Ph.D.). Following scoring pattern was followed:

S. No.	Categories	Score
1.	B.V.Sc.	1
2.	Post graduate	2

Service experience: It refers to the total number of completed years as a veterinary professional. It was measured by directly asking the respondents and quantified by giving a unit score of one for completion of one year. The categorization of respondents was done on the basis of equal interval method as:

S. No.	Categories	Range
1.	Low Experience	Up to 10 years
2.	Moderate Experience	11-20 years
3.	High Experience	Above 20 years

Participation in training: It was a number of zoonosis related trainings attended by the veterinary professionals at the time of data collection. It was measured with the help of an open ended schedule. The respondents were grouped into low (0-2) and high (3-6) categories based on equal intervals method.

3.4.2 Dependent variables: In keeping with the objectives of the study, knowledge level, communication behaviour of dairy farmers and practices being followed by dairy farmers were considered as dependent variables. Attitude of veterinary professionals towards animal hygiene was other dependent variable. The detailed methodology pertaining to each dependent variable is given below:

Knowledge of dairy farmers regarding zoonotic diseases: English and English (1961) defined knowledge as an understood information possessed by an individual or by a culture. The publications of the university were scanned for zoonoses prevention recommendations. However, it was not there as such. The recommendations of the experts from public health were obtained and these were divided into two individual knowledge domains of recommended and contradicted practices (i.e. Do's and Don'ts of practices). These recommendations were in the form of practices that farmers should follow (Do's) and practices that farmers should not follow (Don't) were used

as a basis to assess the knowledge level of the respondents. These recommendations in the form of enlisted Do's and Don'ts were operationalized by allotting equal mark for each item. These were enlisted in the schedule and responses were obtained against each item. The score of 1 was assigned for correct response and a zero was assigned to incorrect response. There were 68 items in all thus making the possible knowledge score range from 0 to 68. The overall knowledge score for each respondent was then calculated by adding up all the scores obtained. Respondents were then grouped into three categories viz., low, medium and high level of knowledge for each sub domain (i.e. Do's& Don'ts) as well as overall using equal class interval method. The detailed questions/items included in the test along with allotted scores have been given in the interview schedule appended in the last of the dissertation.

$$\text{Mean knowledge score} = \frac{\text{Sum of scores obtained for each respondent}}{\text{Number of respondents}}$$

Communication behavior: Communication behaviour is a broad term encompassing the ways individuals articulate their needs, seek, evaluate, select, and use information. In other words, communication behaviour is purposive in nature and is a consequence of a need to satisfy some goal. In the present study, it was operationalized as information seeking behaviour about dairy animals. According to Pettigrew (1996), information-seeking behaviour involves personal reasons for seeking information, the kinds of information which are being sought, and the ways and sources with which needed information is being sought. Scale developed by Pareek and Rao (1992) was used to measure it. This was measured in terms of from where the information was sought, how much information was sought and how frequently information was sought. For measuring from where the information was sought (A) the respondent was requested to give responses on three-point continuum scale, i.e. always, sometimes and never and the scores 2, 1 and 0, were assigned respectively. The minimum and maximum possible obtainable overall scores were 0 and 12. For measuring how much information was sought (B) the respondent was requested to give responses on three-point continuum scale, i.e. all information, some information and no information utilized and the scores 2, 1 and 0, were assigned respectively. The minimum and maximum possible obtainable overall scores were 0 and 14. Finally, to measure how frequently information was sought (C), the respondent was requested to give

responses on four-point continuum scale, i.e. mostly, sometimes, rarely and never utilized and the scores 3, 2, 1 and 0 were assigned, respectively. The minimum and maximum possible obtainable overall scores were 0 and 21.

Information source and its use pattern:

A) Indicate how frequently you use the following sources to get information on dairy farming?

Sr. No.	Information sources	Frequency of use		
		Always (2)	Sometimes (1)	Never (0)
a)	Veterinary hospital			
b)	Progressive farmers			
c)	Neighbours/Friends			
d)	Other farmers			
e)	Training, Demonstration & Field days			
f)	Others (specify)			

B) How much information do you seek in the following activities?

Sr. No.	Activities	How much new information you wish to get		
		All information (2)	Some information (1)	No information (0)
a)	Selection criteria for dairy animal			
b)	Feeding			
c)	Watering			
d)	Supplemental feed preparation			
e)	Storage of feed			
f)	Health care			
g)	Breeding services			

C).How frequently do you seek information in the following activities?

Sr. No.	Activities	Frequency of seeking information			
		Mostly (3)	Sometimes (2)	Rarely (1)	Never (0)
a)	Selection criteria for dairy animal				
b)	Feeding				
c)	Watering				
d)	Supplemental feed preparation				
e)	Storage of feed				
f)	Health care				
g)	Breeding services				

Documenting zoonotically undesirable practices: The observation method was used for documenting the practices being followed by the respondents. An observation sheet was developed by the researcher to document such practices which are potentially harmful. The data was collected by the researcher by visiting the selected household (10%) of the respondents at the time of milking and post-harvest management. All the observations for each selected household were recorded on the sheet. Information about some items was collected by direct questioning of the respondents. These were pooled and analyzed to document a list of potentially undesirable practices in milk production system.

Attitude towards animal hygiene: According to Thurstone (1946) attitude is “degree of positive or negative affect (feeling) associated with some psychological object like symbol, phrase, slogan, person, institution, ideal or ideas towards which people can differ in varying degrees”. In the same way, Guilford (1954) defines attitude as a personal disposition common to individuals but possessed in different degrees. This impels them to react to objects, situations, or propositions in ways that can be called favorable or unfavorable. In the words of Ajzen (1988), attitude is a disposition to respond favorably or unfavorably to an object, person, institution or event. Sarnoff and Katz (1954) and Katz (1960) reported that people hold and express a particular attitude because they derive psychological benefit by doing so. It has been also used to understand human behavior. For example, Eagly and Chaiken (1993) named attitude as one of numerous implicit states or dispositions constructed by psychologists to explain why people react in certain ways in the presence of certain stimuli. Attitudes are acquired through experience and exert a directive influence on subsequent behavior and moreover, help individuals to interpret new information and to make decisions more efficiently than would otherwise be the case (Baron and Byrne, 1991).

Attitude in the present study was conceptualized as the positive or negative disposition of an individual associated with the psychological object of Animal hygiene. The attitude was measured using Likert's technique of summated rating (1932).

Tielen (2000) defined animal hygiene as animal health care practice that includes each form of interaction between abiotic and biotic factors of environment and the domestic animal in its strategies to prevent diseases, to promote animal health,

and to ensure that species-specific as well as age specific welfare needs of such animals are met - especially food animals.

Construction of Attitude scale to measure the attitude of Veterinary Professionals towards animal hygiene:

An appropriate device to measure attitude of veterinary professionals towards animal hygiene in India has not been reported. Therefore, it was decided to construct an attitude scale for this purpose.

In the present study, Likert's method of Summated Rating was used for construction of attitude scale. Likert (1932) claimed that the method of summated ratings is simpler and easier to apply in the development of an attitude scale than the method of equal appearing interval. The different steps followed in the construction of scale are described below:

1) Collection of statements

For construction of attitude scale, first of all an attempt was made to collect statements representing the universe of content related to animal hygiene. After searching a lot of literature and by discussions with experts, subject matter specialists and academicians who were directly or indirectly exposed to such knowledge system, a list of items was prepared.

2) Editing the statements

The statements so collected were edited in the light of the informal criteria suggested by the Thurston and Chave (1929) and Edward and Kilpatrick (1948). The statements which were ambiguous, irrelevant and not conforming to the suggested criteria were deleted and 67 statements (35 Positive + 32 Negative) were retained (Annexure-I).

3) Rating of statements by judges

The academicians, experts, scientists, subject matter specialists in the field of extension education, social sciences and veterinary sciences were approached for seeking their valued judgment and opinion in developing the attitude scale. The 67 statements were listed randomly and sent to 70 judges with well-defined instruction to carefully and critically evaluate the statement. They were requested to give their response as to whether the particular statement is showing favourable, unfavourable or ambiguous (neither favourable nor unfavourable) attitude of an individual towards animal hygiene. They were also requested to add/delete or modify a statement which

they deemed fit for inclusion or deletion. The purpose of administration of these statements to the judges was to screen out statements that were not clear and direct. Thirty-five judges returned the proforma. The score for each item was calculated based on their response. It was decided to select only those statements on which more than 80 per cent of judges agreed. In this way, 37 statements out of 67 were retained and rest were rejected.

4) Selection of Statements

These 37 statements were administered to 30 veterinary professionals from non-study area. The respondents were asked to respond to each one of these statements on a five points continuum viz., strongly agreed, agreed, undecided, disagreed and strongly disagreed with the weightage of 5, 4, 3, 2 and 1 for positive statements and reverse scoring was done in case of negative statements. By summing up the scores obtained for each of the statements included in the scale, the total score for each respondent was obtained. Out of these professionals falling in first quartile and last quartile were taken as high group and low group category, respectively. Mean score of each statement was calculated for both the category of professionals. Difference between the mean score of both categories (high and low group) was calculated (Annexure-II). It indicates the extent to which a given statement differentiates between the high and low group. The statements having more than 0.8 differences were retained in the final attitude scale. In this way, only 22 statements were finally retained (Annexure-III)

5) Reliability of the scale

Guilford (1954) has given basic definition of reliability as the reliability of any set of measurement and is logically defined as the proportion of their variance that is true variance. Reliability depends upon the population measure as well as upon the measurement instruments. According to Anastasi (1968), reliability refer to the consistency of scores obtained by the same individual when examined with test on different occasion or with different set of equivalent items or under other variable examining conditions. The reliability coefficient is a mathematical estimate of the degree to which an instrument is free from measurement error (Talmage and Rasher, 1981). Kerlinger (1995) has defined reliability as the accuracy or precision of measuring instrument. Scale is said to be reliable when it consistently produce the same result when applied to measure the same phenomenon from time to time.

In the present study, split half method was applied. To test the reliability of the scale, the odd even method was favoured to divide statements into two equal halves:

- 1) It assured parallelism.
- 2) It ensured that approximately the same amount of time was devoted to each half.
- 3) It tend to keep testing condition more nearly constant for the two halves for it was highly unlikely that condition either external to tester or internal to him would fluctuate systematically with alternating item.
- 4) It was safer than comparing the first half against the second half since differential informant fatigue or cumulative statements effect might have raised or lowered the true correlation.

Score of all the 30 respondents for each statement of two halves were calculated. The Pearson product moment co-efficient of correlation was computed between the two sets of scores of the scale with the following formula:

$$r = \frac{NXY - (X)(Y)}{[(NX^2 - (X^2))] \cdot [(NY^2 - (Y^2))]}$$

Where,

N = Number of respondents

X = Value of odd numbered statements scores

Y = Value of even numbered statements scores

The value obtained using the above mentioned formula was 0.779. Since this value measures the reliability of only half of the test, an adjustment was made to obtain the true reliability using Spearman – Brown prophecy formula given below:

$$\text{Reliability coefficient of the whole test} = \frac{2 \times (\text{reliability of the half test})}{1 + (\text{reliability of the half test})}$$

The obtained 'r' value was 0.876 which indicated a high reliability of the scale.

6) Validity of the scale

Guilford (1954) said that a test is valid when it measures what it is presumed to measure. According to Kerlinger, the commonest definition of validity is optimized by the question: Are we measuring what we think we are measuring? The emphasis in this question is what is being measured. Anastasi (1976) said that the validity of the test concerns with what the test measures and how well it does so. The validity of the scale refers to degree to which the scale is capable of achieving the aims or purposes. When attitudes are measured, using either Likert scaling or any other type of attitude

measurement, the investigator must establish the validity of the instruments (Sims, 1981). However, validity usually is a matter of degree rather than an all-or-none property and validation is an unending process (Nunnally and Burnstein, 1994). An instrument ought to take into account four aspects of validity namely content validity, predictive validity, concurrent validity and construct validity.

In the present study, keeping in view the resource limitations, only content validity of scale was worked out. Kerlinger (1973) defined content validity as the representativeness or sampling adequacy of the content, the substance, the matter and the topics of a measuring instrument. Content validity is also called as face validity. The content validity is the validity when it appears to measure whatever the author had in mind, what he thought he was measuring. Judgment of face validity is very useful in helping the author in deciding whether the items are relevant to some specific situation. The scale was examined for the content validity of determining how well the content of the scale represented the subject matter under study. In collection and selection of items for the construction of the present scale sufficient care was taken to remain focused on animal hygiene. As all the possible items covering the universe of content were selected by discussing the same with experts, subject matter specialists and reviewing the available literature on the subject as well as by working out agreement scores. Thus, the scale satisfied the content validity.

In this study the attitude of veterinary professionals towards animal hygiene was measured by administering the attitude scale constructed for this purpose. The minimum and maximum possible scores of attitude scale were 58 and 110, respectively.

$$\text{Mean attitude score} = \frac{\text{Sum of scores obtained for each respondent}}{\text{Number of respondents}}$$

7) Final format of Attitude scale:

Final format of Attitude scale was consisted of 22 statements. Out of these 22 statements, 14 statements were positive and remaining were negative. These statements were arranged randomly against a five-point continuum. The five-point continuum was strongly agreed, agreed, undecided, disagreed and strongly disagreed with respective weight age of 5, 4, 3, 2 and 1 for positive statements and reverse order for negative statements (Annexure-III).

3.5 Collection of data

The tool for data collection was prepared in the form of a single questionnaire. The respondents were selected following the sampling procedure described earlier. After having selected respondents, the researcher visited the selected respondents and obtained their responses. The objectives of study were explicitly explained to them, ensuring that they perceived the questions correctly.

3.6 Analysis of data

Keeping in view the objectives of the study, various relevant statistical tools were used for the purpose of analysis and interpretation of collected data. The data were coded, classified, tabulated, analyzed and presented in such a way as to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean, standard deviation, correlation, z- test, ANOVA were worked out for meaningful interpretation of the data. Some of the important methods used in the study are given below:

3.6.1 Tabular analysis

Depending upon the nature of the data, tabular analysis was done and results were presented in frequencies and percentages.

3.6.2 Mean

The arithmetic mean is the quotient that results when sum of all items in the series is divided by the number of items as given below:

$$\bar{X} = \frac{\Sigma X}{n}$$

Where,

\bar{X} = Arithmetic mean

ΣX = Sum of each individual item in a series, and

n = Total number of items in a series

3.6.3 Coefficient of correlation (r)

The Pearson's coefficient of correlation was applied to ascertain the relationship between independent and dependent variables. The formula used was:

$$r = \frac{\Sigma XY - \frac{\Sigma X \Sigma Y}{n}}{\sqrt{\left(\Sigma X^2 - \frac{(\Sigma X)^2}{n} \right) \left(\Sigma Y^2 - \frac{(\Sigma Y)^2}{n} \right)}}$$

Where,

r	=	Coefficient of correlation
n	=	Number of paired observations being correlated
X	=	First variable being correlated
Y	=	Second variable being correlated
ΣXY	=	Sum of products of X and Y
ΣX	=	Summation of overall cell entries of the first variable
ΣY	=	Summation of overall cell entries of the second variable
ΣX^2	=	Sum of all squared values of each cell of first variable
ΣY^2	=	Sum of all squared values of each cell of second variable
$(\Sigma X)^2$	=	Square of sum of overall cell entries of the first variable
$(\Sigma Y)^2$	=	Square of sum of overall cell entries of the second variable

3.6.4 Z-test

Z Test is a concept of statistics which compares means of two populations. Z test assumes normal distribution under null hypothesis. Z test is performed on a large number of data (>30) or on a population data. On the other hand, for a small data or sample data, T test is performed. The score determined by Z test is called "Z score". Z score can be approximated when population standard deviation of a large data is given. Z test uses an assumed value which is generally within the limits of given data to calculate Z score. This value is known as "standardized random variable".

The formula for calculating Z score is given below:

$$Z \text{ score} = (x - \bar{x}) / \sigma$$

Where,

x = Standardized random variable

\bar{x} = Mean of the data

σ = Population standard deviation.

3.6.5 ANOVA

One-way Analysis of variance was done to compare the means of the different groups based on antecedent variables and the two groups of the students and the scientists.

3.7 Interpretation of results and report writing

Based on the statistical analysis of data, results were compiled. Meaningful conclusions are presented in keeping with the objectives of this study.

CHAPTER-IV

RESULTS

This chapter briefly describes the findings of the study. An attempt has been made to outline the findings in a comprehensive and systematic manner. The results are described under following headings in keeping with the objectives of investigation:

- 4.1 Background profile of respondents.**
- 4.2 Knowledge of respondents about prevention of zoonotic diseases.**
- 4.3 Relationship of knowledge of respondents with antecedent variables.**
- 4.4 Communication behaviour of respondents**
- 4.5 Relationship between personal attributes of respondents and their communication behaviour**
- 4.6 Milk production practices**
- 4.7 Background profile of veterinary professionals**
- 4.8 Attitude of veterinary professionals towards Animal hygiene**
- 4.9 Relationship between attitude scores of veterinary professionals and their personal attributes**

4.1 Background profile of respondents

Before discussing the main findings of the study it is customary to present the personal attributes of the respondents. The study included 180 respondents of two categories (i.e. household dairy farmers and commercial dairy farmers). The profile of the total respondents is summarized in table-1. It is evident that the observed age of the respondents was 18-83 years thus indicating representation of all age groups with the mean age being 42.83 years. A large majority of respondents were having medium educational qualification of with a majority having dairy farming experience between 16 to 18 years. However, respondents were having both joint and nuclear families with joint families being higher in numbers. Further, a majority of respondents were of general caste category. Their social participation was poor. Most of the respondents were holding 1 to 5 acre of land. Respondents' scores varied from low to medium in different variables like experience in dairy farming, mass media exposure and extension participation while scores of variables like herd size, risk orientation and scientific orientation varied from medium to low. These are described in detail in later sections.

Table 1: Background profile of respondents

Sr. No.	Variable		Household Farmers		Commercial Farmers		Overall	
		Possible Range	Observed Range	Mean± SD	Observed Range	Mean± SD	Observed Range	Mean± SD
1	Age	-	18-83	42.99±13.71	25-63	41.60±10.54	18-83	42.83±13.38
2	Education	0-6	0-6	3.65±2.02	0-6	4.70±1.38	0-6	3.77±1.98
3	Experience in dairy farming	-	1-58	18.36±12.75	1-35	15.80±10.43	1-58	18.07±12.51
4	Type of Family	1-2	1-2	1.49±0.50	1-2	1.40±0.50	1-2	1.48±0.50
5	Social participation	1-5	1-5	1.39±0.97	1-2	1.20±0.41	1-5	1.37±0.93
6	Mass media exposure	0-14	0-14	7.25±4.09	1-3	2.25±0.79	0-14	6.69±4.17
7	Caste	1-3	1-3	2.46±0.79	1-3	2.65±0.67	1-3	2.48±0.78
8	Land holding	0-6	0-5	1.73±1.09	0-6	1.90±1.59	0-6	1.74±1.15
9	Herd size	-	1-26	5.52±4.16	9-69	25.20±15.20	1-69	7.71±8.85
10	Extension participation	0-8	0-7	2.79±1.86	1-6	3.25±1.33	0-7	2.84±1.81
11	Risk orientation	10-50	13-48	29.98±8.66	14-42	30.50±8.24	13-48	30.04±8.60
12	Scientific orientation	14-70	18-68	43.94±13.24	23-60	46.30±9.51	18-68	44.21±12.88
13	Economic motivation	0-12	1-12	5.49±3.06	10-12	11.00±0.79	1-12	6.11±3.38

Table 2: Distribution of the respondents according to various antecedent characteristics

Sr. No.	Attributes	Category	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall (n=180)	
			frequency	%	frequency	%	frequency	%
1.)	Age							
		Young (18-30 years)	36	22.50	3	15	39	21.67
		Middle (31-55 years)	98	61.25	14	70	112	62.22
		Old (56-83 years)	26	16.25	3	15	29	16.11
		Mean	42.99		41.60		42.83	
		S.D.	13.71		10.54		13.38	
2.)	Educational Qualification	Illiterate	24	15.00	1	5	25	13.89
		Can read only	12	7.50	0	0	12	6.67
		Can read and write	8	5.00	0	0	8	4.44
		Primary	10	6.25	1	5	11	6.11
		Middle	19	11.88	4	20	23	12.78
		High school& 10+2	72	45.00	9	45	81	45.00
		Graduate and above	15	9.38	5	25	20	11.11
		Mean	3.65		4.70		3.77	
		S.D.	2.02		1.38		1.98	
3.)	Experience in dairy farming	Low (1-20 years)	94	58.75	14	70	108	60.00
		Medium (21-39 years)	55	34.38	6	30	61	33.89
		High (40-58 years)	11	6.88	0	0	11	6.11
		Mean	18.36		15.80		18.07	
		S.D.	12.75		10.43		12.51	
4.)	Type of Family	Joint	81	50.63	12	60	93	51.67
		Nuclear	79	49.38	8	40	87	48.33
		Mean	1.49		1.40		1.48	
		S.D.	0.50		0.50		0.50	

5.)	Social participation	No membership	129	80.63	16	80	145	80.56
		Member of an organization	17	10.63	4	20	21	11.67
		Member of more than one organization	2	1.25	0	0	2	1.11
		Office holders	6	3.75	0	0	6	3.33
		Wide public leader	6	3.75	0	0	6	3.33
		Mean	1.39		1.20		1.37	
		S.D.	0.97		0.41		0.93	
6.)	Mass media exposure	Low (Below 6)	60	37.50	20	100	80	44.44
		Medium (6-11)	73	45.63	0	0	73	40.56
		High (Above 11)	27	16.88	0	0	27	15.00
		Mean	7.25		2.25		6.69	
		S.D.	4.09		0.79		4.17	
7.)	Caste	SC/ST	30	18.75	2	10	32	17.78
		OBC	27	16.88	3	15	30	16.67
		General	103	64.38	15	75	118	65.56
		Mean	2.46		2.65		2.48	
		S.D.	0.79		0.67		0.78	
8.)	Land holding	Landless	30	18.75	3	15	33	18.33
		Less than 1 acre	25	15.63	7	35	32	17.78
		1 to 5 acre	71	44.38	4	20	75	41.67
		6 to 10 acre	28	17.50	4	20	32	17.78
		11 to 15 acre	5	3.13	0	0	5	2.78
		16 to 20 acre	1	0.63	1	5	2	1.11
		More than 20 acre	0	0.00	1	5	1	0.56
		Mean	1.73		1.90		1.74	
		S.D.	1.09		1.59		1.15	

9.)	Herd size	Small (1 - 2)	34	21.25	0	0	34	18.89
		Medium (3 - 5)	69	43.13	0	0	69	38.33
		Large (Above 5)	57	35.63	20	100	77	42.78
		Mean	5.52		25.20		7.71	
		S.D.	4.16		15.20		8.85	
10.)	Extension participation	Low (Below 4)	114	71.25	13	65	127	70.56
		Medium (4 - 6)	39	24.38	7	35	46	25.56
		High (Above 6)	7	4.38	0	0	7	3.89
		Mean	2.79		3.25		2.84	
		S.D.	1.86		1.33		1.81	
11.)	Risk orientation	Low (Below 26)	51	31.88	7	35	58	32.22
		Medium (26 - 37)	71	44.38	10	50	81	45.00
		High (Above 37)	38	23.75	3	15	41	22.78
		Mean	29.98		30.50		30.04	
		S.D.	8.66		8.24		8.60	
12.)	Scientific orientation	Low (Below 36)	46	28.75	3	15	49	27.22
		Medium (36-52)	73	45.63	14	70	87	48.33
		High (Above 52)	41	25.63	3	15	44	24.44
		Mean	43.94		46.30		44.21	
		S.D.	13.24		9.51		12.88	
13.)	Economic motivation	Low (Below 5)	47	29.38	0	0	47	26.11
		Medium (5 - 8)	79	49.38	0	0	79	43.89
		High (Above 8)	34	21.25	20	100	54	30.00
		Mean	5.49		11.00		6.11	
		S.D.	3.06		0.79		3.38	

4.1.1 Age of the respondents:

The data presented in table-2 reveals that a majority of respondents (61.25%) were of middle age followed by young and old. Likewise, a majority of commercial respondents were of middle age comprising 70.00 per cent. Overall, the average age of the respondents was 42.83 years and ranged from 18 to 83 years.

4.1.2 Educational qualification

Education of the respondents is one of the important factors influencing their knowledge level. It is evident from table-2 that as high as 45.00 per cent of household respondents were having high school and 10+2 level of education, followed by illiterate (15.00%), middle (11.88%), graduate and above (9.38%). The commercial respondents also possessed high school and graduate and above level of education to the extent of 45.00 and 25.00 per cent, respectively.

On the whole, a significant number of respondents had passed high school and 10+2 (45.00%). Only 13.89 per cent were illiterate.

4.1.3 Dairy farming experience

The average experience of the respondents in dairy farming was quite high with average being 18.07 years. Among the household category of dairy farmers, a majority of the respondents (58.75%) were having a low level of farming experience while 34.38 and 6.88 per cent of them were having medium and high level of farming experience, respectively. On the other hand, the respondents of commercial dairy farmer's category, were having similar farming experience with different frequencies i.e. 70, 30 and 0 per cent had low, medium and high level of farming experience. On the whole, a majority of the respondents (60.00%) were having low level of experience, while 33.89 per cent of them were having medium level of experience.

4.1.4 Type of family

In household dairy farmers' category, approximately equal percentages (50.63% and 49.38%) of respondents were having both the family types i.e. joint and nuclear. A majority of the respondents (60%) in commercial category respondents were having joint and the remaining 40 percent were having nuclear families.

4.1.5 Social participation

The data given in table-2 reveals that 80.63 per cent of household respondents were having no social participation. Similarly, in case of commercial category respondents 80 per cent were not involved with any social organization. In other words, it can be said that very meager percentage of respondents exhibited social participation.

4.1.6 Mass media exposure

It refers to the exposure and use of different mass media for getting information by the respondents. The overall mass media exposure of respondents was moderate with average score of 6.69 (table-1) out of a maximum possible score of 14. It can be seen from table-2 that in case of household respondents, 45.63 per cent of the respondents were having medium level mass media exposure while 37.50 and 16.88 percent of respondents were having high and low level of mass media exposure. On the other hand, respondents of commercial category were having low level of mass media exposure (100%). On the whole, a majority of the respondents were having low level of mass media exposure (44.44%) while 40.56 per cent of them were having medium level of mass media exposure. Only a handful (15%) of the respondents were having high mass media exposure.

4.1.7 Caste

It refers to the socially stratified status of respondents under study. It can be seen from table-2 that in case of household respondents, 18.75, 16.88 and 64.38 per cent of the respondents belonged to SC/ST, OBC and general categories, respectively. Similarly, in case of respondents from commercial category a majority of them were from general category. Overall, a majority of the respondents were of general category (65.56%) while 17.78 per cent of them belonged to the SC/ST category followed by OBC category (16.67%).

4.1.8 Land holding

The overall land holding of the respondents was poor with average score of 1.74 (table-1). The data summarized in table-2 reveals that among the household respondents, the highest percentages of respondents were holding 1 to 5 acre land (44.38%). Almost one fifth (18.75%) were landless. Finally, 17.5 per cent of them were having 6 to 10 acres of land. As far as the respondents of commercial category were concerned, 35 per cent of them were having less than 1 acre land holdings, followed by same percentage (15% each) holding land between 1 to 5 acre and 6 to 10 acre. Again, 15 percent of commercial respondents were landless. On the whole, a majority of the respondents (81.68%) possessed land. Of these, 41.67 per cent of them possessed 1 to 5 acres. Almost one fifth (18.33%) of respondents were landless.

4.1.9 Herd size

As can be seen from the table-1 that there was lot variation in herd size. The average was 7.71 with SD being 8.85. Similarly, herd strength of commercial

respondents was also highly variable with mean and SD being 25.20 and 15.20, respectively. The respondents were classified into three categories based on their herd size i.e. small, medium and large (table-2). A closer look at the table-1 reveals that overall herd size of the respondents was 7.71. Among household dairy farmers, a majority of respondents (43.13%) were having medium herd size followed by 35.63 per cent of respondents with large herd. About one fifth (21.25%) were having small size of herd. As expected, all the commercial respondents were having large herd size.

4.1.10 Extension participation

The overall extension contact score of the respondents was poor with the average being 2.84 (table-1). It can be seen from the table-2 that respondents of household farmer's category were having low, medium and high level of extension contacts with their respective percentages being 71.25, 24.38 and 4.38 percent. In case of commercial farmers, the results were similar to household farmer's category. On the whole, a majority of the respondents (70.56%) were having low level of extension contact, followed by medium (25.56%) and high (3.89%) level.

4.1.11 Risk orientation

It appears that the respondents preferred to take risks. The mean value obtained was 30.04 out of a maximum possible of 48 (table-1). The data presented in table-2 reveals that a majority of household respondents (44.38%) were having medium level of risk orientation. The remaining 31.88 and 23.75 per cent of respondents were having low and high level of risk orientation, respectively. Similarly, a majority of commercial respondents exhibited medium level of risk orientation.

4.1.12 Scientific orientation

The overall scientific orientation of the respondents was good with average score of 44.21. The respondents were classified into three categories based on their scientific orientation i.e. small, medium and large (table-2). In the present study, a significant proportion of respondents (45.63%) were having medium level of scientific orientation while 28.75 and 25.63 per cent of them were having low and high level, respectively. Similarly, in case of commercial respondents, majority of respondents (70%) were also having medium level of scientific orientation.

4.1.13 Economic motivation

The respondents were moderately motivated economically. The mean value obtained was 6.11 out of a maximum possible of 12 (table-1). The information in table-2 depicts that most of the respondents (49.38%) possessed medium level of economic motivation whereas 29.38 per cent of them were having low level. In the commercial farmers' category, 100 per cent of the respondents possessed high level of economic motivation.

4.2 Knowledge of respondents about prevention of zoonotic diseases

A schedule was developed for assessment of knowledge and absent recommended preventive practices. The knowledge of respondents belonging to household and commercial category of farmers was assessed in two broad aspects of zoonoses prevention practices viz., Do's and Don't practices. The distribution is depicted in Figures-3 to 6. Knowledge level of respondents of two categories regarding zoonoses prevention practices was ascertained and results are presented accordingly (table-3).

The respondents were classified into three categories based on their knowledge level i.e. low, medium and high (table-4). The results of the same are summarized in table-4 and graphically represented in Fig. 4.

The average knowledge score about Do's of zoonotic diseases exhibited by respondents was 33.02. There were differences between knowledge level of household and commercial respondents. The household farmer's average score was 32.38 while commercial farmer's average score was 38.20. Similarly, there were variations in knowledge about Don'ts. The average knowledge score about Don'ts of zoonotic diseases obtained by respondents was 13.86. The household farmer's average score was 13.43 while commercial farmer's average score was 17.35.

It can be seen from table-4 that in case of household respondents, a majority (43.75%) were having medium knowledge about "Do's" while the remaining 39.38 and 27 per cent were having low and high knowledge scores, respectively. Similarly, the household respondents' knowledge about 'Don'ts' was 68, 53 and 39 per cent in medium, low and high knowledge score categories, respectively. On the contrary, a higher percentage (80%) of commercial respondents obtained high knowledge scores about 'Do's' practices. Again, a higher percentage of commercial respondents (60%) were having higher knowledge scores when asked about 'Don'ts'.

Table 3: Summary of knowledge scores of respondents

Sr. No.	Variable		Household Farmers		Commercial Farmers		Overall	
		Possible Range	Observed Range	Mean± SD	Observed Range	Mean± SD	Observed Range	Mean± SD
1	Do's	0-47	21-45	32.38±5.60	30-41	38.20±2.33	21-45	33.02±5.64
2	Don'ts	0-21	6-21	13.43±3.87	13-20	17.35±2.60	6-21	13.86±3.95
3	Overall Knowledge	0-68	28-66	45.80±8.98	45-61	55.55±4.32	28-66	46.88±9.11

Table 4: Distribution of respondents on the basis of level of knowledge scores about Do's and Don'ts

Do's Knowledge						
Category	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall(n=180)	
	Frequency	%	Frequency	%	Frequency	%
Low (21-29)	63	39.38	0	0	63	35
Medium (30 - 37)	70	43.75	4	20	74	41.11
High (38-47)	27	16.88	16	80	43	23.89
Don'ts Knowledge						
Category	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall(n=180)	
	Frequency	%	Frequency	%	Frequency	%
Low (6- 11)	53	33.13	0	0	53	29.44
Medium (12 - 16)	68	42.50	8	40	76	42.22
High (17-21)	39	24.38	12	60	51	28.33

The average knowledge score of respondents was 46.88. The results were classified into three categories based on knowledge score that are low (28 – 41), medium (42 – 54) and high (55 – 68). This categorization was done on the basis of observed range. The commercial dairy farmers were having better knowledge about prevention of zoonotic diseases than the household farmers, the mean scores being 55.55 and 45.80, respectively (table-5). A closer look at the table-5 reveals that more than half the number of household respondents (56.25%) was having medium level of knowledge about prevention of zoonotic diseases while 31.25 and 12.50 per cent of household respondents were observed to be with low and high level of knowledge. In case of commercial category of respondents, majority (60%) of respondents were having high level of knowledge.

Table 5: Distribution of respondents on the basis of level of overall knowledge scores

Category	Knowledge					
	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall (n=180)	
	F (%)	Average score	F (%)	Average score	F (%)	Average score
Low (28 - 41)	50 (31.25)	35.52	0 (0)	0	50 (27.78)	32.52
Medium (42 - 54)	90 (56.25)	48.11	8 (40)	51	98 (54.44)	48.35
High (54 - 68)	20 (12.50)	61.1	12 (60)	58.58	32 (17.78)	60.16

On the whole, it can be seen that a majority (54.44%) of respondents were having medium level of knowledge and remaining 27.78 and 17.78 per cent were having high and low level, respectively.

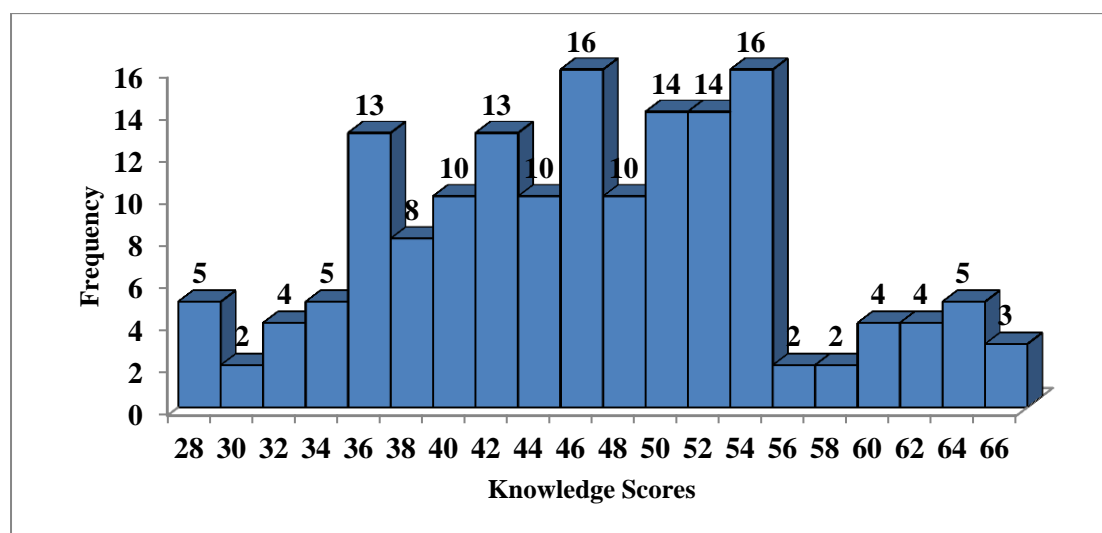


Fig.4: Histogram depicting frequency distribution of knowledge scores of household respondents.

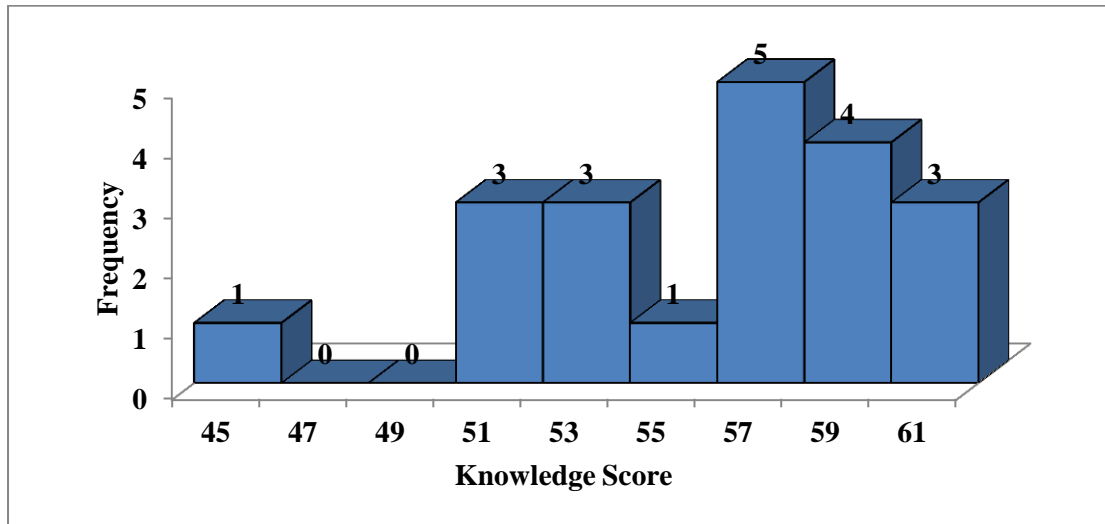


Fig.5: Histogram depicting frequency distribution of knowledge scores of commercial respondents.

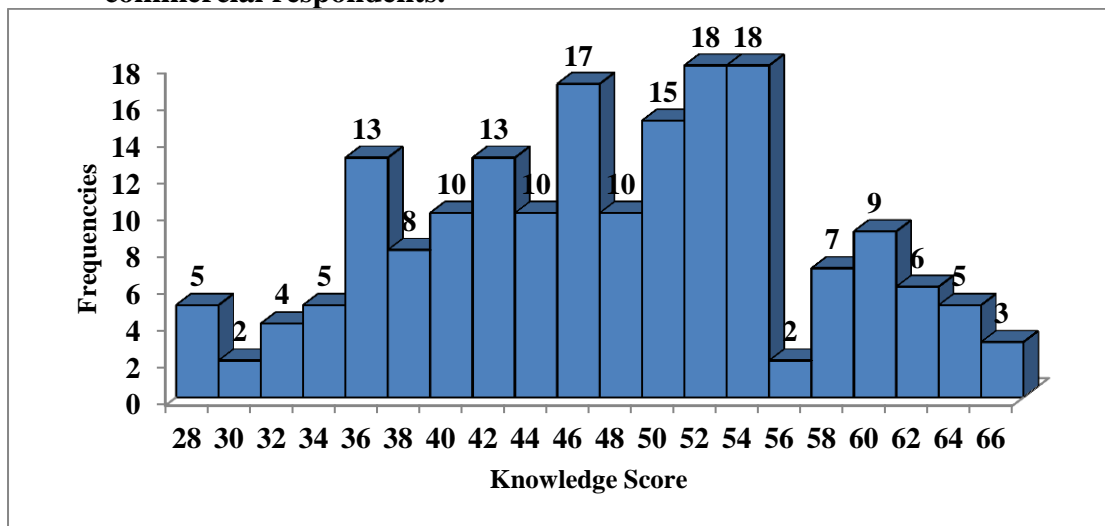


Fig.6: Histogram representing frequency distribution of overall respondents according to knowledge scores.

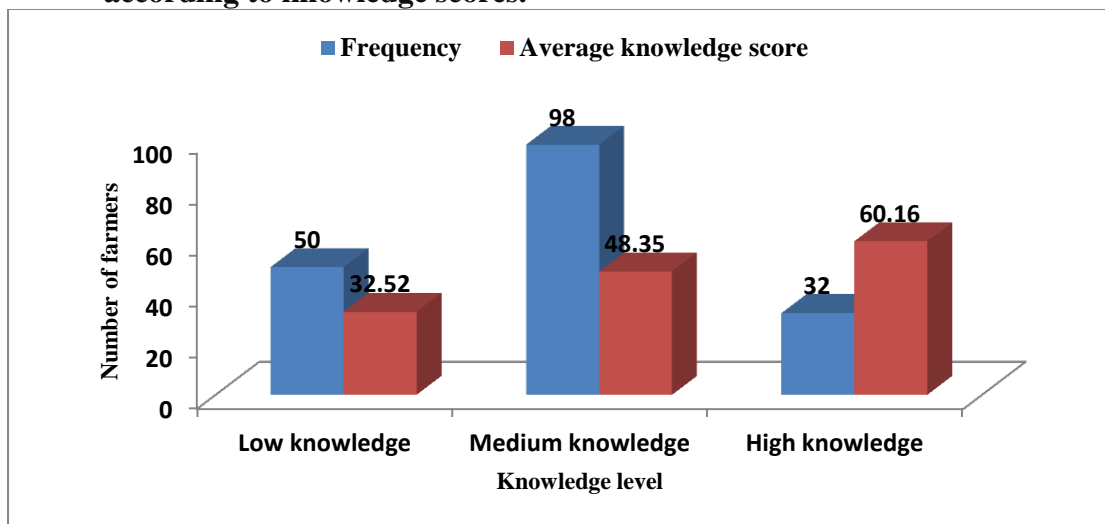


Fig 7: Categories of respondents based on knowledge scores

4.3 Relationship of knowledge of respondents with antecedent variables

It is also important to understand the nature and degree of relationship between knowledge and other personality traits of the respondents. In order to ascertain the relationship, spearman's coefficients of correlation were calculated. The correlation coefficients between knowledge scores and other traits of the respondents are summarized in the table-6. The traits are considered here as independent variables because these traits are considered here as presumed cause of knowledge and communication behaviour.

It is evident from the table-6 that among household category of farmers, age ($r = 0.82$), experience in dairy farming ($r = 0.87$), caste ($r = 0.28$), land holding ($r = 0.33$), herd size ($r = 0.21$), extension participation ($r = 0.24$), risk orientation ($r = 0.86$) and economic motivation ($r = 0.22$) were having positive and significant correlation with knowledge. On the other hand, education ($r = -0.15$) and mass media exposure ($r = -0.12$) were having significant but negative correlation with knowledge scores. Five variables, namely, education ($r = -0.15$), type of family ($r = -0.10$), social participation ($r = 0.05$), mass media exposure ($r = -0.12$) and scientific orientation ($r = 0.08$) were not having any significant correlation with knowledge scores. In case of commercial category of farmers, there were varying degrees of association but none of variable was statistically significantly associated.

Table 6: Correlation between personal attributes and knowledge score of respondents

Sr. No.	Attribute	Household farmers	Commercial farmers	Overall
		'r' value	'r' value	'r' value
1.	Age	0.82 ^{**}	0.05	0.73 ^{**}
2.	Education	-0.15	-0.04	-0.08
3.	Experience in dairy farming	0.87 ^{**}	-0.10	0.75 ^{**}
4.	Type of Family	-0.10	-0.01	-0.11
5.	Social participation	0.05	-0.27	0.01
6.	Mass media exposure	-0.12	-0.38	-0.24 ^{**}
7.	Caste	0.28 ^{**}	-0.06	0.28 ^{**}
8.	Land holding	0.33 ^{**}	-0.32	0.27 ^{**}
9.	Herd size	0.21 ^{**}	0.37	0.36 ^{**}
10.	Extension participation	0.24 ^{**}	-0.30	0.23 ^{**}
11.	Risk orientation	0.86 ^{**}	-0.25	0.75 ^{**}
12.	Scientific orientation	0.08	-0.02	0.09
13.	Economic motivation	0.22 ^{**}	0.34	0.35 ^{**}

*Significant at 5% level of probability

** Significant at 1% level of probability

4.4 Communication behaviour of respondents

The overall communication behaviour of respondents was moderate with an average of 24.22 (table-7). The communication behavior was studied in three components each of which is described separately. In comparison to commercial respondents, the household respondents utilized lesser sources to get information. The distribution of communication behavior scores is depicted in figure-7 to 10. The overall average score was 6.52. Further, they exhibited characteristics of seeking fairly well extent of information about different activities. The mean value obtained was 9.02 out of a maximum possible of 14. The scores of the respondents of household and commercial category indicate that household farmers seek more information (mean value 9.26) in different activities than commercial dairy farmers do (mean value 7.05). At the same time, they were having poor scores in case of frequency at which they seek information about different activities with mean value of 8.68, the maximum possible score being 21. The respondents were classified into three category based on their communication behaviour scores i.e. low, medium and high (table-8). It can be seen from table-8 that a significant percentage (60%) of respondents were having medium level. In the present study, a majority of household respondents (58.13%) were having medium level of communication behaviour while 28.75 and 13.13 per cent of them were having high and low level, respectively. Similarly, in case of commercial respondents, majority (75%) of respondents were also having medium level

of communication behaviour and remaining all the 25 per cent commercial dairy respondents were having high level of communication behaviour.

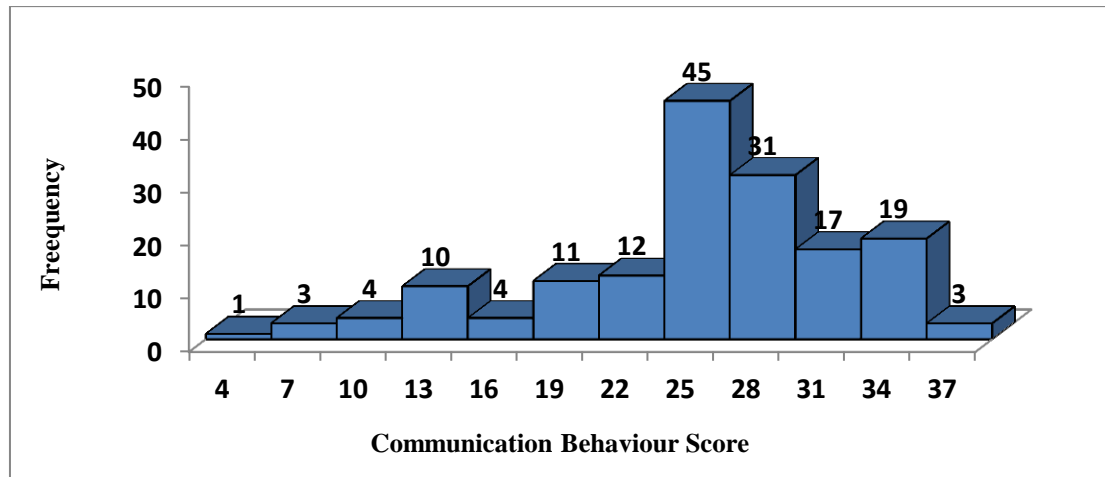


Fig.8: Histogram depicting distribution of communication behaviour scores of household respondents

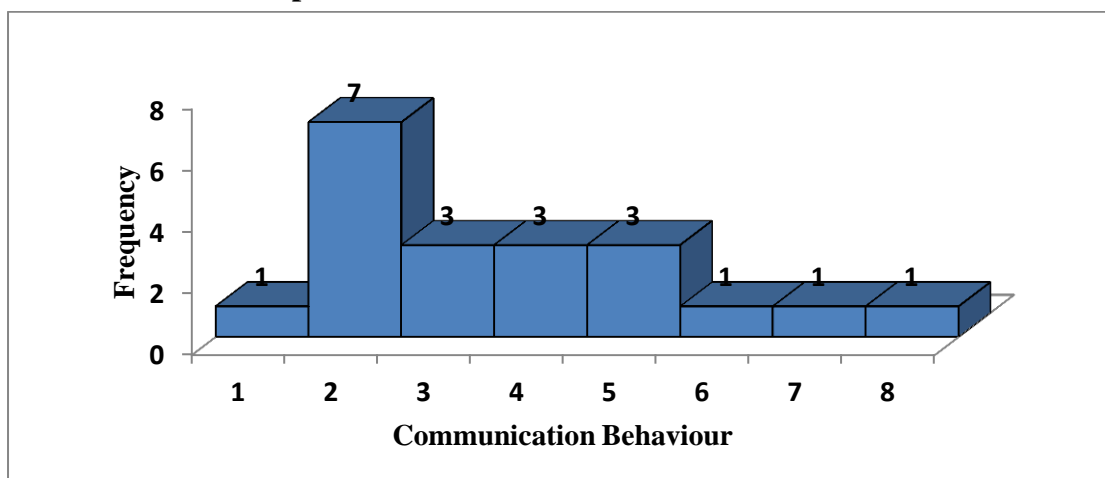


Fig.9: Histogram depicting communication behaviour scores of commercial respondents

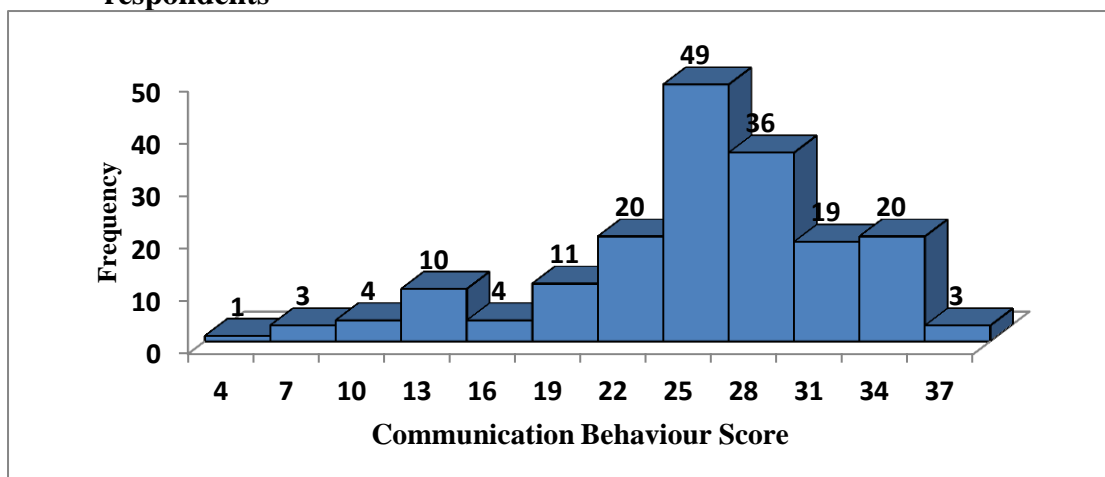


Fig.10: Histogram depicting communication behaviour scores of overall respondents

Table 7: Communication behaviour of respondents

Sr. No.	Variable	Possible Range	Household Farmers		Commercial Farmers		Overall	
			Observed Range	Mean± SD	Observed Range	Mean± SD	Observed Range	Mean± SD
1	Frequency of use of sources to get information	0-12	0-11	6.30±2.91	6-11	8.30±1.42	0-11	6.52±2.85
2	Extent of information do farmers seek in the different activities	0-14	0-13	9.26±2.88	5-13	7.05±1.96	0-13	9.02±2.88
3	Frequency at which farmer seek information in the different activities	0-21	1-13	8.58±2.92	7-13	9.55±1.76	1-13	8.68±2.82
4	Overall scores	0-47	4-37	24.14±6.81	20-34	24.90±3.77	4-37	24.22±6.54

Table 8: Distribution of respondents according their communication behaviour

Variable	Category	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall(n=180)	
		F (%)	*Avg. score	F (%)	*Avg. score	F (%)	*Avg. score
Communication Behaviour	Low (Below 16)	21 (13.13)	10.86	0 (0)	0	21 (11.67)	10.86
	Medium (16 - 27)	93 (58.13)	23.52	15 (75)	23.13	108 (60)	23.46
	High (Above 27)	46 (28.75)	31.46	5 (25)	30.2	51 (28.33)	31.33

*Avg score=average communication behaviour score

Table 9: Distribution of respondents according to different constituents of communication behaviour

Frequency of use of sources to get information						
Category	Household Farmers (n=160)		Commercial Farmers (n=20)		Overall (n=180)	
	F	%	F	%	F	%
Low (Below 5)	40	25.00	0	0	40	22.22
Medium (5 – 8)	87	54.38	13	65	100	55.56
High (Above 8)	33	20.63	7	35	40	22.22
Extent of information which farmers seek in the different activities						
Category	Household Farmers		Commercial Farmers		Overall (n=180)	
	F	%	F	%	F	%
Low (Below 5)	15	9.38	0	0	15	8.33
Medium (5 - 8)	22	13.75	17	85	39	21.67
High (Above 8)	123	76.88	3	15	126	70
Frequency at which farmer seek information in the different activities						
Category	Household Farmers		Commercial Farmers		Overall (n=180)	
	F	%	F	%	F	%
Low (Below 6)	19	11.88	0	0	19	10.56
Medium (6 - 9)	84	52.50	12	60	96	53.33
High (Above 9)	57	35.63	8	40	65	36.11

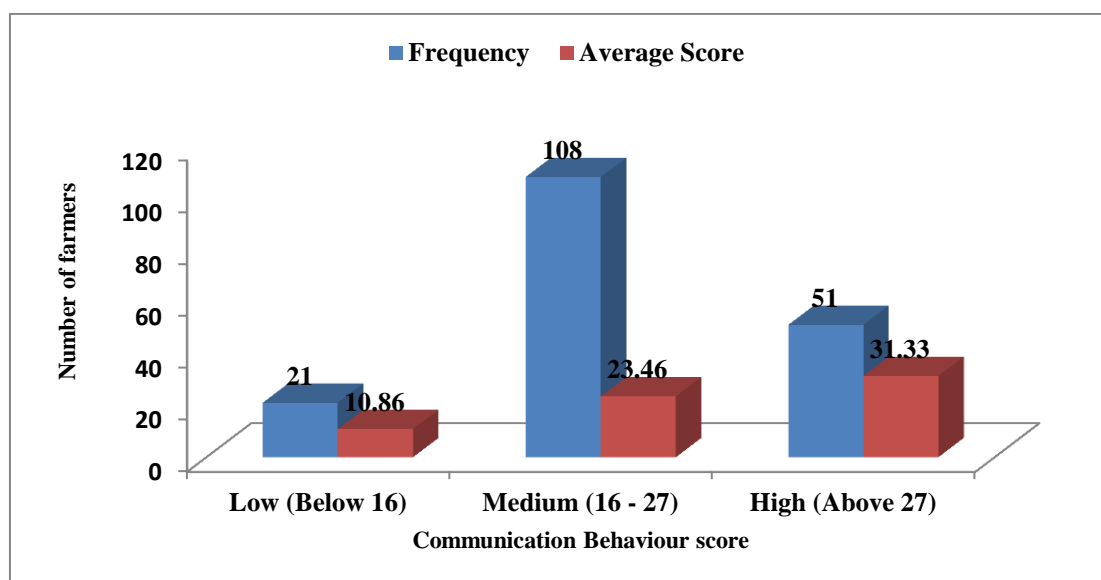


Fig 11: Categories of respondents based on communication behaviour score

4.4.1 Information source use pattern

A perusal of the table-9 reveals that a majority of the respondents (55.56%) belonged to medium category in terms of frequency of using different sources to get information on prevention of zoonotic diseases. On the other hand, a large majority (70%) obtained higher scores as far as extent of information sought was concerned. Only a handful of the respondents (8.33%) were seeking minimal information about different activities. On the whole, it can be seen that a large number of respondents were having complex communication behavior which is adequately discussed in the next chapter.

4.4.2 Pattern of information seeking behaviour of the respondents

4.4.2.1 Item-wise sources utilized by respondents to obtain information

The results regarding sources of information are summarized in the table-10. Evidently, other farmers including progressive farmers were most frequently utilized as information sources. veterinary hospital, neighbours, training, demonstration & field days and other miscellaneous sources were relatively less utilized as information sources.

4.4.2.2 Item-wise extent of information sought by respondents

The data in table-11 reveal that respondents were seeking information about Selection criteria for disease free animal, Storage of feed, Supplemental feed preparation and Health care, while feeding, breeding services and watering were least sought areas.

Table 10: Item-wise sources utilized by respondents to obtain information

Sr. No	Items/Areas	Overall respondents (n=180)		
		Total Score	MS	Rank
1	Veterinary hospital	241	1.34	III
2	Progressive farmers	252	1.40	II
3	Neighbours/Friends	240	1.33	IV
4	Other farmers	277	1.54	I
5	Training, Demonstration &Field days	105	0.58	V
6	Others	14	0.08	VI

Table 11: Item - wise extent of information sought by respondents

Sr. No	Items/Areas	Overall respondents (n=180)		
		Total Score	MS	Rank
1	Selection criteria for disease free animal	262	1.46	I
2	Feeding	222	1.23	V
3	Watering	219	1.22	VII
4	Supplemental feed preparation	235	1.31	III
5	Storage of feed	240	1.33	II
6	Health care	228	1.27	IV
7	Breeding services	221	1.23	VI

4.4.2.3 Item-wise frequency with which farmers seek information about different activities

The frequency of information sought by the respondents was in line with the extent to which information was sought.

Table 12: Item - wise frequency of respondents for seeking information

Sr. No	Items/Areas	Overall respondents (n=180)		
		Total Score	MS	Rank
1	Selection criteria for disease free animal	262	1.46	I
2	Feeding	249	1.38	II
3	Watering	218	1.21	IV
4	Supplemental feed preparation	233	1.29	III
5	Storage of feed	212	1.18	V
6	Health care	200	1.11	VI
7	Breeding services	190	1.06	VII

4.5 Relationship between personal attributes of respondents and their communication behaviour

The relationship between personal attributes and communication behaviour scores of respondents is summarized in the table-13. Evidently, the relationship between communication behaviour and personal attributes was varying between household and commercial farmers indicating different patterns of the two categories. It is clear that extension participation, social participation, caste and risk orientation played significantly important role when compared to other factors like mass media exposure etc.

Table 13: Correlation between personal attributes and communication behaviour score of respondents

Sr. No.	Attribute	Household farmers	Commercial farmers	Overall
		'r' value	'r' value	'r' value
1.	Age	0.39 ^{**}	-0.10	0.36 ^{**}
2.	Education	0.17 [*]	0.38	0.19 [*]
3.	Experience in dairy farming	0.35 ^{**}	-0.00	0.32 ^{**}
4.	Type of Family	-0.19 [*]	-0.34	-0.20 ^{**}
5.	Social participation	0.50 ^{**}	0.12	0.48 ^{**}
6.	Mass media exposure	0.12	0.24	0.10
7.	Caste	0.45 ^{**}	-0.20	0.42 ^{**}
8.	Land holding	0.36 [*]	-0.10	0.31 ^{**}
9.	Herd size	0.30 ^{**}	0.19	0.18 [*]
10.	Extension participation	0.69 ^{**}	0.27	0.67 ^{**}
11.	Risk orientation	0.46 ^{**}	0.53 ^{**}	0.46 ^{**}
12.	Scientific orientation	0.24 ^{**}	0.28	0.24 ^{**}
13.	Economic motivation	0.28 ^{**}	0.04	-0.25 ^{**}

*Significant at 5% level of probability

** Significant at 1% level of probability

4.6 Milk production practices

The results of the observation regarding undesirable dairy farming practices are described under different subheadings: - preparation, milking and storage.

4.6.1 Preparation: The practices followed by the farmers are described in further sub heads – including environment and equipment.

Environment

As evident from table-14, it is clear that a majority (82.5%) of the observed dairy farms were having permanent shed, but less than half of them were having cemented floor. A large majority of commercial respondents were running their dairy farms in a permanent shed. More than half the numbers (55%) of observed dairy shed were located in areas with a foul smell. More of commercial dairy sheds were placed in areas with a foul smell. It can be seen that 85 per cent of respondents were allowing animals in the shed after/before milking. During the observation it could be seen that 67.5 per cent of shed be thoroughly cleaned after every milking while less than half the number (47.5%) of respondents were keeping the floor of the shed clean and dry.

Equipment

It can be seen from the table-14 that a meager number of respondents (32.5%) were using aluminium or stainless steel cans for milking and storing milk and half the numbers (50%) of respondents were using plastic containers. Further, 20 and 45 per cent of household and commercial respondents were using aluminium or stainless steel cans for milking and storing milk while 30 per cent and 50 per cent of household and commercial respondents were using plastic containers, respectively. None of the household respondent was keeping a separate “strip cup” for testing milch animals for mastitis. On the whole, it can be seen from table-14 that a very small number of respondents (5%) were keeping a separate “strip cup” for testing cows for mastitis. A majority of respondents (92.5%) were cleaning all utensils as soon as possible after milking with 65 per cent of household respondents rinsing utensils with cold water before scrubbing it with a brush. In case of commercial respondents, all of them (100%) were rinsing utensils with cold water at the both of times (before and after scrubbing). Only a handful (10%) of the household respondents were scrubbing utensils with a brush using hot water and detergent. On the other hand, 60 per cent of the commercial respondents were scrubbing utensils with a brush using hot water and detergent while 40 per cent in this category were only brushing utensils without hot water or detergent or both.

Table-14 reveals that after rinsing, practice of placing the utensils on a rack to dry in the sun was being followed by 55 per cent household and 35 per cent commercial respondents. The practice of cleaning all containers immediately after emptying milk was being followed by 85 and 90 per cent of household and commercial respondents, respectively. Not a single respondent was found having milking machines at his/her dairy farm.



Fig 12: Some photographs of the visited commercial dairy farms.

Table 14: Practices followed by farmers during preparation for milking

Environment				
Sr. No.	Practices	Number of respondents following the practice		
		Household (n=20)	Commercial (n=20)	Overall (n=40)
		N (%)	N (%)	N (%)
a)	A permanent shed.	15 (75)	18 (90)	33 (82.5)
b)	Cemented floor.	6 (30)	12 (60)	18 (45)
c)	Shed is placed in areas with a foul smell	9 (45)	13 (75)	22 (55)
d)	Animals are allowed in the shed after/before milking	20 (100)	14 (70)	34 (85)
e)	The shed be thoroughly cleaned after every milking.	11 (55)	16 (80)	27 (67.5)
f)	When not in use, the floor of the shed be kept clean and dry.	12 (60)	7 (35)	19 (47.5)
Equipment				
Sr. No.	Practices	Number of respondents following the practice		
		Household (n=20)	Commercial (n=20)	Overall (n=40)
		N (%)	N (%)	N (%)
a)	Aluminium or stainless steel cans are used for milking and storing milk.	4 (20)	9 (45)	13 (32.5)
b)	Regular plastic containers used.	6 (30)	14 (70)	20 (50)
c)	A separate “strip cup” for testing cows for mastitis prior to milking is kept.	0 (0)	2 (10)	2 (5)
d)	Clean all utensils as soon as possible after milking.	17 (85)	20 (100)	37 (92.5)
e)	Utensils and containers- Rinse with cold water	13 (65)	20 (100)	33 (82.5)
f)	Scrub with a brush using hot water and detergent (un-perfumed liquid soap).	2 (10)	12 (60)	14 (35)
g)	Rinse with cold water.	4 (20)	20 (100)	24 (60)
h)	Place on a rack to dry in the sun.	11 (55)	7 (35)	18 (45)
i)	Store containers and utensils in a safe, clean and well-ventilated room when not in use.	14 (70)	11 (55)	24 (60)
j)	Clean all containers immediately after emptying milk.	17 (85)	18 (90)	35 (87.50)
k)	Milking machines	0 (0)	0 (0)	0 (0)

4.6.2 Milking: The observations regarding practices followed by farmers during milking are described under subheads- Animal health and hygiene, Personal hygiene and techniques for milking.

Animal health and hygiene

The responses regarding these practices were obtained from the farmers during the course of interview. The practice of vaccination in animals against diseases was followed by less than half the number (45%) of total household respondents. Contrarily, 90 per cent of commercial respondents preferred their animals being immunized. Apart from this, it came across that more than half the number of household respondents (55%) conducted periodic checks for all types of contagious diseases of their animals, whereas the handful of respondent (10%) preferred to contact a qualified veterinary practitioner. The percentage was much higher in case of commercial respondents.

Personal hygiene

It could be seen from table-15 that all the persons involved in milking cows were apparently healthy but majority of household respondents (90%), were not apparently clean. Slightly less than three quarters of the total observed dairy farmers were keeping their fingernails short. Half of the household respondents used to do this, whereas in the case of commercial farmers, this percentage was higher. Only 5 per cent of commercial respondents and a very small per cent of overall respondents were observed with long hair and covering their heads.

Techniques for milking cows

It can be seen that 20 and 70 per cent of household and commercial respondents were using soap and clean water for washing hands thoroughly before milking, respectively. Also, 15 and 5 per cent of household and commercial respondents were smoking during milking time, respectively.

35 and 75 per cent of the household and commercial farmers preferred to dry hands with a clean towel after washing, respectively. All the household respondents washed the udder with warm clean water, while in case of commercial respondents 60 per cent were washing the udder with warm clean water. Only 10 per cent of respondents preferred to dry udder using a dry towel while though not a single household respondent was found to follow this desirable practice but one fifth of commercial respondents were doing it.

Table 15: Practices followed by farmers during milking

Animal health and hygiene							
Sr. No.	Practices	Number of respondents following the practice					
		Household (n=20)		Commercial (n=20)		Overall (n=40)	
		N (%)		N (%)		N (%)	
		Yes	No	Yes	No	Yes	No
a)	Vaccinate animals against zoonotic diseases.	9 (45)	11 (55)	18 (90)	2 (10)	27 (67.5)	13 (32.5)
b)	Check animals periodically for all types of contagious diseases.	11 (55)	9 (45)	14 (70)	6 (30)	25 (62.5)	15 (37.5)
c)	When a cow is suspected being sick, contact a qualified veterinary practitioner immediately.	2 (10)	18 (90)	16 (80)	4 (20)	18 (45)	22 (55)
d)	Milk is consumed and/or sold from cow under antibiotic therapy.	5 (25)	15 (75)	9 (45)	11 (55)	14 (35)	26 (65)
Personal hygiene							
Sr. No.	Practices	Number of respondents following the practice					
		Household (n=20)		Commercial (n=20)		Overall (n=40)	
		N (%)		N (%)		N (%)	
a)	Person involved in milking cows is healthy and clean.	2 (10)		12 (60)		14 (35)	
b)	Fingernails are short	10 (50)		16 (80)		26 (65)	
c)	People with long hair cover their heads.	0 (0)		1 (5)		1 (2.5)	
d)	Smoking during milking time.	3 (15)		1 (5)		3 (7.5)	

Techniques for milking cows				
Sr. No.	Practices	Number of respondents following the practice		
		Household (n=20)	Commercial (n=20)	Overall (n=40)
		N (%)	N (%)	N (%)
a)	Wash hands thoroughly with soap and clean water before milking.	4 (20)	14 (70)	18 (45)
b)	After washing hands dry with a clean towel immediately before milking.	7 (35)	15 (75)	22 (55)
c)	Wash the udder with warm clean water with disinfectant.	12 (60)	6 (30)	18 (45)
d)	Dry udder using a dry towel.	0 (0)	4(20)	4 (10)
e)	Before milking, test for mastitis using a strip cup.	0 (0)	0 (0)	0 (0)
f)	If mastitis is detected, then that cow be milked last.	19 (95)	18 (90)	37 (92.5)
g)	Once begin, milk quickly and completely, without interruption.	14 (70)	19 (95)	33 (82.5)
h)	When milking, be sure to squeeze the teat.	14 (70)	20 (100)	34 (85)
i)	When finished, “strip” the animal to get the last drops out of the udder.	12 (60)	19 (95)	31 (77.5)
j)	After an animal is done, dip the teats in a teat dip.	0 (0)	1 (5)	1 (2.5)
k)	Make sure that the animal remains in a standing position for at least one hour after milking.	3 (15)	9 (45)	12 (30)

When milking, 70 per cent of observed household respondents preferred to squeeze the teat in comparison to all of commercial respondents. When finished, majority of respondents were striping the animal to get the last drops. None of household respondent used teat dips while 5 per cent of commercial respondents were doing this. Only a handful number of household respondents were keeping their animals in a standing position for at least one hour after milking. Similarly, less than half of the commercial respondents were making sure that the animal remains in a standing position for at least one hour after milking.

4.6.3 Handling and storage of milk

Handling

When transferring milk between containers, all the commercial respondents were pouring the milk directly from one container into the other instead of scooping it with a cup or bucket while majority of household respondents was also practicing the same.

Storage

A majority (85%) of commercial respondents were straining milk using a white filter cloth or strainer immediately after milking. The number was far less in case of household respondents. As per recommendation, after using cloth/strainer, it is disinfected, washed and dried but not a single respondent was following this practice as such. It was observed that no household farmer ever felt the need to store milk. Similarly, 35 per cent of commercial respondents never stored milk. All the dairy farmers (household and commercial) preferred to deliver milk to the market as soon as possible.

One fourth the number of household respondents and a majority of commercial respondents were found to keep the lids of the cans loose to allow warm air to escape.

Only two commercial respondents immersed the milk can in boiling water for at least 30 minutes.

Table 16: Practices followed by farmers during handling and storage of milk

Handling				
Sr. No.	Practices	Number of respondents following the practice		
		Household (n=20)	Commercial (n=20)	Overall (n=40)
		N (%)	N (%)	N (%)
a)	When transferring milk between containers, pour the milk directly from one container into the other instead of scooping it with a cup or bucket.	17 (85)	20 (100)	37 (92.5)
Storage				
Sr. No.	Practices	Number of respondents following the practice		
		Household (n=20)	Commercial (n=20)	Overall (n=40)
		N (%)	N (%)	N (%)
a)	Filter milk (Use a white filter cloth or strainer) immediately after milking and prior to storage.	7 (35)	17 (85)	24(60)
b)	Disinfect, wash and dry the cloth/strainer after use.	0 (0)	0 (0)	0 (0)
c)	Store milk without chemicals in a cool, clean room set aside for milk only.	0 (0)	11 (55)	11 (27.5)
d)	Store milk at high temperatures.	0 (0)	0 (0)	0 (0)
e)	Mix warm (morning) milk with cool (evening) milk.	0 (0)	0 (0)	0(0)
f)	If this is not possible, cool the warm milk by placing the container in cold water before mixing.	0 (0)	0 (0)	0 (0)
g)	Deliver milk to the market as soon as possible, preferably in the cool morning or evening.	20 (100)	20 (100)	40 (100)
Cooling Milk in the shade / in a cold water bath or stream				
a)	Loosen the lids of the cans to allow warm air to escape.	5 (25)	16 (80)	21 (52.5)
b)	Keep the lid closed if there are insects or dust in the area, to avoid contamination.	5 (25)	17 (85)	22 (55)
Heating milk before storage (pasteurization)				
a)	Immerse the milk can in boiling water for at least 30 minutes.	0 (0)	2 (10)	2 (5)

4.7 Background profile of veterinary professionals

Before describing the main findings of the study it is desirable to present the personal attributes of the respondents. The study included 68 veterinary professionals of two districts (i.e. Hisar and Jind). The profile of the total respondents has been summarized in table-17. From the table-17 it was evident that the observed mean age was 35.24 years which indicates majority of younger professionals. A large majority of respondents were males. The post graduate veterinary professionals were more in numbers than graduate veterinary professionals. Most of the respondents had never participated in any zoonoses related training. Respondents' scores varied from low to high in service experience. These are described in detail in later sections.

Table 17: Background profile of veterinary professionals

S. no.	Variable	Veterinary professionals		
		Possible Range	Observed Range	Mean \pm SD
1.	Age (years)	-	26-56	35.24 \pm 8.77
2.	Gender	1-2	1-2	1.12 \pm 0.32
3.	Educational qualification	1-2	1-2	1.53 \pm 0.50
4.	Service experience	-	1-30	8.09 \pm 8.49
5.	Participation in zoonoses related training	0-1	0-1	0.24 \pm 0.43
6.	Frequency of participation in zoonoses related training	-	0-6	0.43 \pm 1.07

4.8 Attitude of veterinary professionals towards animal hygiene

The attitude was measured using animal hygiene attitude scale constructed by researcher using Likert's technique of summated rating (1932). There were 22 statements in the scale and scoring was done based on a five point continuum. The minimum and maximum possible scores of attitude scale were 22 and 110, respectively. The minimum score obtained by the respondents was 58 while the maximum score obtained was 110. Mean score of all the 68 respondents was 92.24 \pm 11.09 (mean \pm SD) indicating favourable attitude.

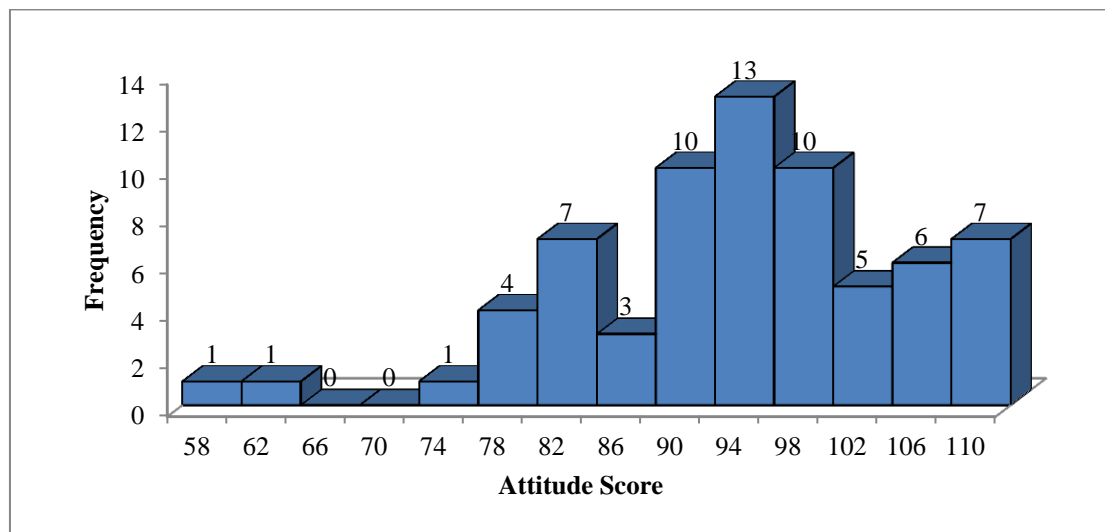
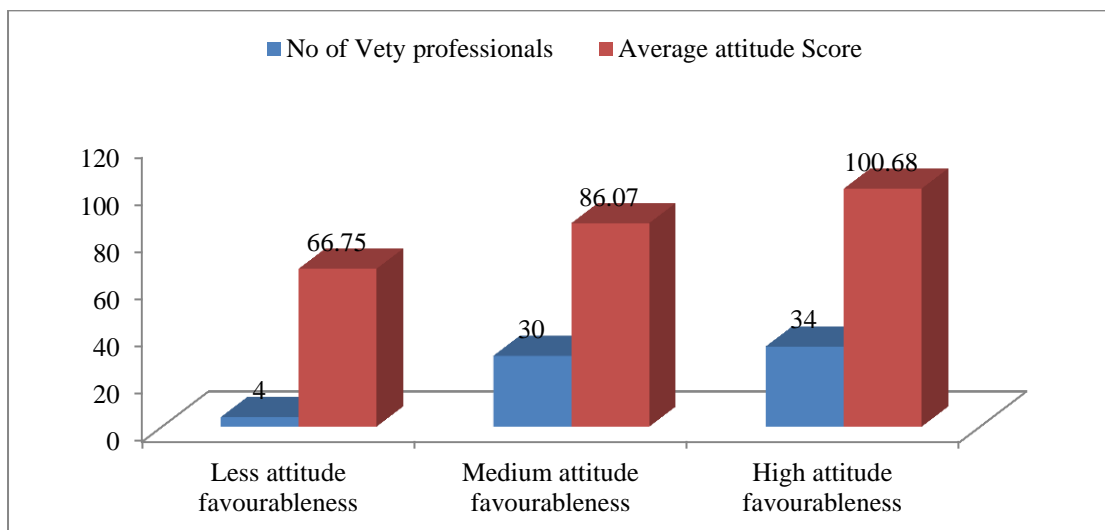
The respondents were categorized into three categories of attitude favourableness (i.e. less favourable, favourable and strongly favourable) based on their total scores (table-18).

Table 18: Classification of respondents on the basis of attitude scores

S. No.	Attitude level	Overall (n=68)		
		Frequency	%	Mean Score
1	Less Favourable (Below 76)	4	5.88	66.75
2	Favourable (76-92)	30	44.12	86.07
3	Strongly Favourable (Above 92)	34	50.00	100.68
Mean±SE		92.24±1.34		
S.D.		11.09		

n = number of respondents

On the whole, it can be seen that a majority of veterinary professionals were having moderately favourable to strongly favourable attitude towards animal hygiene.

**Fig.13: Histogram depicting frequency distribution of veterinary professionals according to attitude scores****Fig 14: Diagram depicting the distribution of veterinary professionals across different categories of attitude favourableness**

4.9 Relationship between attitude scores of veterinary professionals and their personal attributes

This section presents the results of relationship of attitude scores of respondents with antecedent variables. The F/Z value in table-19 presented below broadly indicates that age, educational qualification and service experience were significantly associated with the attitude favourableness of the respondents (table-19). Relationship between the attitude scores and individual factors has been described in the following sections.

4.9.1 Relationship between attitude scores of veterinary professionals and their age

The age of the respondents was significantly correlated with the attitude scores (table-19). The respondents were categorized into three age groups i.e. young (<36 years), middle (36-48 years) and old age group (> 48 years) for the analysis. It can be seen that the young aged veterinary professionals scored higher (table-19).

4.9.2 Relationship between gender and attitude scores of respondents

The results indicate that female respondents were having more favourable attitude towards animal hygiene than the male respondents, the mean scores being 94.5 and 91.93, respectively (table-19). Differences in the mean attitude scores of respondents of both the genders were not statistically significant (table-19).

4.9.3 Attitude scores of respondents based on their education level

The relationship between the attitude scores of respondents and their level of education was highly significant (table-19). Veterinary professionals with Post Graduate degree scored higher.

4.9.4 Attitude scores of respondents based on their service experience

A majority (67.65%) of veterinary professionals were having service experience of less than 11 years but their average attitude score (94.65) was more favourable than the average score of professionals having service experience of 11 or more.

4.9.5 Attitude scores of respondents based on their participation in any zoonosis related training

Although those veterinary professionals scored higher who had never participated in any zoonoses related training programme than those who had obtained some training, yet there attitude scores did not vary greatly (table-19).

Table 19: Distribution of attitude scores of respondents

Variable	Range	Attitude level				Average Attitude Score	F/Z value
		Less Favourable (<76)	Favourable (76 - 92)	Strongly Favourable (>92)	Total		
		F (%)	F (%)	F (%)	F (%)		
Age (yrs)	Young (<36 Years)	1 (1.47)	19 (27.94)	27 (39.71)	47 (69.12)	94.77 ^a	4.519*
	Middle (36-48 Years)	3 (4.41)	5 (7.35)	5 (7.35)	13 (19.12)	85.62 ^b	
	Old (>48 Years)	0 (0.00)	6 (8.82)	2 (2.94)	8 (11.76)	88.13 ^{ab}	
Gender	Male	4 (5.88)	27 (39.71)	29 (42.65)	60 (88.24)	91.93	-0.612
	Female	0 (0.00)	3 (4.41)	5 (7.35)	8 (11.76)	94.5	
Educational Qualification	B.V.Sc.	4 (5.88)	17 (25.00)	11 (16.18)	32 (47.06)	88.44 ^a	-2.794**
	Post graduate	0 (0.00)	13 (19.12)	23 (33.82)	36 (52.94)	95.61 ^b	
Service Experience	Low Experience (<11 years)	1 (1.47)	19 (27.94)	26 (38.24)	46 (67.65)	94.65 ^a	4.119*
	Moderate Experience (11-20 years)	2 (2.94)	5 (7.35)	6 (8.82)	13 (19.12)	88.92 ^{ab}	
	High Experience (>20 years)	1 (1.47)	6 (8.82)	2 (2.94)	9 (13.24)	84.67 ^b	
Participation in zoonosis related trainings	Yes	2 (2.94)	7 (10.29)	7 (10.29)	16 (23.53)	88.81	1.423
	No	2 (2.94)	23 (33.82)	27 (39.71)	52 (76.47)	93.29	
Frequency of participation in zoonosis related trainings	Low (0-2)	3 (4.41)	28 (41.18)	34 (50.00)	65 (95.59)	93.00	-----
	High (3-6)	0 (0.00)	3 (4.41)	0 (0.00)	3 (4.41)	75.67	

*Significant at 5% level of probability** Significant at 1% level of probability

4.8.6 Attitude scores of respondents based on their frequency of participation in zoonosis related trainings

On the basis of scores obtained, the respondents were divided in two categories i.e. with low frequency of participation (0-2) and with high frequency of participation (3-6).

Further, classification of respondents into high and low frequency categories revealed that higher attitude scores were obtained by respondents with extremely low participation in zoonosis related trainings (table-19). Although it was statistically significant.

CHAPTER-V

DISCUSSION

In this chapter, an attempt has been made to discuss and interpret the findings of the research in the light of previous similar studies. For the sake of convenience, the discussion part of the present investigation is presented the following heads:

5.1 Profile of respondents

5.2 Knowledge of respondents about prevention of zoonotic diseases

5.3 Communication behaviour of respondents.

5.4 Item-wise extent of practices followed by respondents

5.5 Relationship between personal attributes of respondents with their knowledge about prevention of zoonotic diseases.

5.6 Relationship between personal attributes of respondents with communication behaviour

5.7 Background profile of veterinary professionals

5.8 Attitude of veterinary professionals towards animal hygiene.

5.9 Relationship between attitude scores of veterinary professionals and their personal attributes

5.1 Profile of respondents

5.1.1 Age of the respondents: A majority of the respondents belonged to middle age group though respondents of all age groups are engaged in dairy farming. These results are in conformity with the findings reported by Ahuja (2015), Hundal *et al.* (2016), Vekariya *et al.* (2016), Sarita *et al.* (2016), Munisamy *et al.* (2017) and Atreya *et al.* (2018).

5.1.2 Educational Qualification: More than eighty-six per cent of respondents were literate and a significant percentage of the respondents were having high school & 10+2 formal education. These results are similar to the observations of Ahuja (2015), Babu *et al.* (2015), Hundal *et al.* (2016), Vekariya *et al.* (2016) and Sarita *et al.* (2016).

5.1.3 Dairy farming experience: The average experience of the respondents was 18.07 years with a wide range. It seems that respondents were continuously pursuing

it and not quitting or entering into the enterprise frequently. It goes well with the accepted notion of mixed farming being practiced in Haryana. The average experience of commercial respondents was slightly on the lower side indicating that new entrepreneurs are entering into it though the difference is not very significant. These findings are partially in conformity with that of Munisamy *et al.* (2017).

5.1.4 Type of family: Almost an equal number of respondents belonged to joint and nuclear families in case of household category. In case of commercial category, a majority belonged to joint family, while the rest of respondents belonged to nuclear family. Similar pattern of family type was reported by Vekariya *et al.* (2016) while varying trends were reported by Sarita *et al.* (2016) and Atreya *et al.* (2018).

5.1.5 Social participation: The respondents in the present study exhibited poor social participation denoting lack of formal social institutions. It is also possible that their access is very limited. This finding is in partial consonance with the findings of Gulkari *et al.* (2014), Ahuja (2015), Sarita *et al.* (2016) and Vekariya *et al.* (2016) who indicated that majority of the respondents had no social participation.

5.1.6 Mass media exposure: A majority of the respondents belonged to the low level of mass media exposure category followed by those having moderate exposure. Only a handful of respondents were having high mass media exposure. The above observations are also similar to the findings of Rachna (2012) and Sarita *et al.* (2016) who reported that majority of the respondents were having low level of mass media exposure. The widening reach of mass communication methods such as radio, television, videos and print media offer good prospects for its effective utilization in disseminating agricultural information (Farrington *et al.*, 1998). But it appears that the extension agencies are not making full use of this potentially effective way of disseminating information.

5.1.7 Caste: Dairy farming was much popular amongst the general category of respondents. It can partially be attributed to the prevalent system of mixed farming in villages of Haryana. Also it was observed that a significant percentage of SC and OBC category respondents are taking up dairy farming as 17.78 per cent and 16.67 per cent of respondents were of SC and OBC category, respectively. These results are almost similar to Ahuja (2015) who reported that a majority of respondents were belonging to general category.

5.1.8 Land holding: A majority of the respondents possessed land in varying sizes.

However, a significant majority of these were small and marginal farmers. Almost similar results were reported by Ahuja (2015), Sarita *et al.* (2016), Vekariya *et al.* (2016) and Atreya *et al.* (2018) who reported that majority of dairy respondents possessed land holdings.

5.1.9 Herd size: The herd size possessed by the respondents varied significantly with the average being 5 animals. However, a large standard deviation of 4.16 indicates that the variation in herd size was significant. It is also suggestive of the changing patterns of dairy animal keeping. The respondents seem to be keeping animals with different expectations and sets of resources. However, this needs further investigations.

5.1.10 Extension Participation: A majority of the respondents were having low extension participation which is indicative of poor information access especially about improved dairy husbandry practices. These results are in line with findings of Sarita *et al.* (2016).

5.1.11 Risk orientation: It appears that a large majority of respondents were not risk averse. The average scores obtained by the two categories of respondents were more or less similar (table-2). It may seem to indicate that dairy farming is being perceived as riskier enterprise now. On the contrary, it is also possible that respondents are willing to take risk in general. These findings are in line with the findings of Jha (2008) and Lawrence and Ganguli (2012) who reported that majority of respondents were having medium level of risk orientation.

5.1.12 Scientific orientation: A majority of the respondents possessed medium level of scientific orientation. It appears more and more respondents are inculcating scientific orientation. The findings of the study are in conformity with Prajapati (2011), Mehta and Sonawane (2012), Patel (2013) and Ahuja (2015) who reported that majority of the respondents were having medium level of scientific orientation.

5.1.13 Economic motivation: It was noticed that all the respondents of commercial dairy farmers category were having high economic motivation while the household respondents scored varyingly. This seems to indicate that economic motivation plays a very significant role as far as choosing dairying as an enterprise is concerned. These findings are in conformity with the findings reported by Prajapati (2011), Rachna (2012) and Sarita *et al.* (2016) who reported that majority of the respondents had medium economic motivation.

5.2 Knowledge level of respondents about prevention of zoonotic diseases

The knowledge scores obtained by the respondents in both the areas i.e. Do's and Don't's varied considerably (table-3). The minimum score obtained was the 28 with the highest being 68. This indicates that the respondents' knowledge seeking behavior plays an important role. It also indicates that the knowledge about zoonoses prevention is there in the social system as the respondents would not have scored high in the absence of such a knowledge. Further, there were significant differences between commercial and household respondents. More of commercial respondents scored high when compared to household respondents. Further classification of respondents in the three categories revealed that none of the commercial category respondents was lying in low score category. This further strengthens the earlier proposition that the acquisition of such knowledge requires active role by the respondents. Other way round, it can be conjectured here that extension system is not disseminating such information effectively or the issue does not come up frequently during interaction between farmers and extension functionaries. Earlier, Bhabhor (2015) reported medium level of knowledge of dairy farmers. Also, Thakkar (2013) reported that a majority of the farmers practicing dairy farming had low to medium level of knowledge about zoonotic diseases. Prajapati *et al.* (2015) revealed that majority (63.5%) of the respondents had medium, whereas 16 and 20.5 percent of the respondents had high and low level of knowledge about recommended health care practices. Although a majority of workers have earlier reported that medium level of knowledge was there amongst respondents but whether it was actually sufficient to hamper the threat of zoonotic diseases is questionable. For example, Hundal (2016) after a study in Punjab concluded that the zoonotic diseases may be transmitted to the human being through contaminated milk, meat, air, feed, or through contact with infected animals but this fact is not known to all of the farmers though their overall knowledge level was medium. If the respondents are not even aware that such diseases can be transmitted through contaminated milk, meat, air, feed, or through contact with infected animals, even the moderate knowledge of respondents is ineffective. So it is suggested that further studies to ascertain specific recommendations knowledge and adoption should be carried besides including the zoonoses prevention in the regular extension programmes. It is also proposed that

mass media can be effectively utilized for disseminating information about such threats. It is admitted that the mass media exposure of the respondents was on the lower side in the present study. But development of newer and interesting mass media messages by using modern graphics can work wonders in promoting knowledge and motivating farmers taking effective steps for prevention of such diseases. Kumar *et al.* (2015) believe that Changing patterns of agricultural and animal husbandry practices correlate well with the microbial and vector types and densities. In their opinion liberalisation in trade of livestock and livestock products, shifting animal/bird populations, and fast travel and communication have contributed in creating opportunities for the agents of diseases and vectors to migrate to newer territories. Thus the threat of zoonotic diseases spreading is much higher now. Active participation of farmers armed with adequate knowledge can go a long way in reducing the risk.

5.3 Communication behaviour of respondents

It was observed that as high as 60 per cent of respondents scored moderately in terms of communication behaviour followed by high and low level (table-8). This again seems to indicate that the respondents communication behavior is significantly varying. This finding is in conformity with the findings reported by the Suresh (2004), Nande *et al.* (2009) and Rakesh *et al.* (2016) who reported that majority of milk producers had medium level of information seeking behavior. Kavithaa *et al.* (2014) also revealed that majority of the respondents had medium to high level of information seeking behavior. The situation becomes clearer when the components of the communication behavior are looked at closely.

5.3.1 Frequency of use of sources to get information

A majority of respondents used different sources moderately to get information. This seemingly indicates that farmers are seeking information about dairy animals. Similar results were observed by Prasad (2006) who reported that majority of respondents (52.50%) had medium level of frequency of contact. The sources utilized by the respondents most of times were other and progressive farmers followed by veterinary hospital, neighbours/ friends, training etc. This indicates that respondents in general want to emulate progressive farmers. It appears that a majority of respondents look for legitimized information in simple terms which largely is provided by such progressive farmers. The literature, however, is abound with varying

reports of different sources being utilized by the farmers. For example, Prasad (2006) earlier reported that out of twelve sources of information, four sources of information namely superintendent of livestock, neighbours, friends and progressive farmers were used most of the times by dairy farmers. Nande *et al.* (2009) reported that dairy farmers mostly sought information from friends followed by neighbours, other dairy farmers, relatives, progressive dairy farmers and village leader. Pradeep and Rajkamal (2010) reported that radio followed by newspaper and friends were the most frequently utilized communication sources. While Kavithaa *et al.* (2014) reported that only 5.71 percent of the respondents indicated fellow farmers as their source of information.

5.3.2 Extent of information which respondents seek in the different activities

A majority of the respondents were classified in high category considering the extent of information they sought. It seems to indicate that they are frequently seeking information about dairy animals. This can be seen in the light of their economic motivation also. Notably, respondents were seeking most of the information on Selection criteria for disease free animal followed by Storage of feed, Supplemental feed preparation and health care. On the other hand, information in areas like routine feeding, Breeding services and Supplemental feed preparation was least sought. It is to be noted here that breeding and feeding are two most important areas which affect the success of a dairy enterprise. Yet respondents were not seeking information in these areas frequently. Earlier also, after conducting a study in Haryana, Ahuja (2015) reported that in farmer's opinion the least needed training areas was animal breeding. It appears respondents viewed success of dairy enterprise more with selection of good animal and with good quality supplemental feed preparation.

5.3.3 Frequency at which respondent seeks information in the different activities

A majority of the respondents were classified in medium category in terms of frequency with which respondents seek information in different activities. As pointed out earlier, the respondents preferred to seek information pertaining to Selection criteria for disease free animal, Supplemental feed preparation, etc. These findings, to some extent, find conformity with Ahuja (2015) who found that the most expressed training needs of farmers was regarding miscellaneous practices as approximately 85 per cent of respondents were perceiving themselves weak in these practices followed by feeding, marketing, health care, management and breeding practices. However,

Singh *et al.* (2016) reported some other aspect of dairy farmer's information need and revealed that 70.58% farmers needed information on different subsidy schemes of the Government, followed by 70% on feed and fodder and 64.70% on animal breeding. Gangil *et al.* (2019) who conducted a study in five district of Punjab, observed that out of total areas health care was perceived as most priority area followed by breeding, feeding, management and marketing.

It is suggested that further studies to understand the communication behavior of respondents are needed. It is also emphasized here that newer tools of measurement that capture the realistic state of communication behavior should be developed and utilized to fully understand the underpinnings of dairy farmers' communication behavior. Of course, it is admitted that such an attempt will encounter measurement difficulties given the qualitative, deep and semantic problems associated with the communication process.

5.4 Item-wise extent of practices followed by respondents

5.4.1 Preparation practices

Environment: A majority of the observed dairy farms were having permanent shed, but less than half of these were having cemented floor. More than half the numbers of observed dairy sheds were located in areas with a foul smell. A significantly large majority of respondents were allowing animals in the shed after/before milking. Less than half the number of respondents were found to keep the floor of the shed clean and dry, when not in use.

Equipment: A very small number of respondents were using aluminium or stainless steel cans for milking and storing milk. Almost half the numbers of respondents were using regular plastic containers. Similarly, only a handful of respondents were keeping a separate "strip cup" for testing cows for mastitis prior to milking. A majority of respondents were cleaning all utensils as soon as possible after milking with cold water and generally followed with it with scrubbing with a brush. On the other hand, almost one third of the respondents were scrubbing utensils with a brush using hot water and detergent. The practice of placing the utensils on a rack to dry in the sun was being followed by less than half of respondents. Not a single respondent was found having milking machines at his/her dairy farm. It is opined that extension agencies should adopt HACCP approach in identifying and promoting such practices which can significantly reduce the microbial load thus in turn not only improving the

quality of milk but also diminishing the zoonoses risk. For example, a simple campaign to promote hot water and detergent for washing utensils can be effective. Or a simple message like not allowing animals to sit immediately after milking can significantly reduce the mastitis incidence.

5.4.2 Milking

Animal health and hygiene: The vaccination of animals against diseases was being followed by almost three fourth of the respondents. Less than half of respondents preferred to contact a qualified veterinary practitioner in the first instance when an animal was noticed sick.

Personal hygiene: A majority of persons involved in milking were apparently healthy but not clean. This was more so the case in case of household respondents.

Techniques for milking cows: Although more than half the number of respondents were washing hands before milking but not using soap. Almost half the respondents washed the udder with warm clean water but without disinfectant. Less than one third the number of respondents were keeping their animals in a standing position after milking.

5.4.3 Handling and storage

Handling: When transferring milk between containers, almost all the respondents were observed pouring the milk directly from one container into the other instead of scooping it with a cup or bucket.

Storage: A majority of respondents were filtering milk immediately after milking but none preferred to disinfect the cloth/ strainer after use. They preferred to wash it with simple water. A large percentage of respondents preferred not to store milk. All the respondents delivered milk to the market as soon as possible. A majority of respondents were keeping the lids of the cans loose to allow warm air to escape.

It is suggested that the regular extension programmes should emphasize the need to maintain hygiene in and around farms. Use of recommended soaps and detergents for personal hygiene and equipment needs to be promoted consistently. Also there is need to promote practices like cleaning udder in recommended way and not allowing animals to sit after milking so as to reduce the incidence of mastitis.

5.5 Relationship between personal attributes of respondents with their knowledge about prevention of zoonotic diseases

The knowledge scores of respondents were strongly correlated with age,

experience and risk orientation. It appears that the dairying as an enterprise is being viewed as risky. The correlation with age and experience is understandable given the higher likelihood of coming across the pertinent knowledge. It further adds strength to the earlier proposition that knowledge about zoonoses prevention is actively acquired by the respondents and is less likely to be available uniformly to all the respondents. Some other factors like economic motivation and herd size were also moderately associated. Similar findings were observed by Sarita *et al.* (2017). Surprisingly, mass media exposure scores were mildly but negatively related to the knowledge scores. It can be hypothesized here that younger respondents have higher mass media exposure but their knowledge scores were lower and this might have resulted in the negative association (table-6). Other factors were weakly correlated with the knowledge scores of respondents. However, it is to be noted that the degree of association between personal attributes and knowledge scores was not uniform in both the categories of farmers i.e. household and commercial farmers. This clearly indicates that the information acquisition behavior of respondents of both categories varied radically at least in terms of zoonoses prevention information.

5.6 Relationship between personal attributes of respondents and communication behaviour scores

The relationship between personal attributes of respondents and their communication scores is presented in table-13. It is evident that attributes like age, experience, social participation, caste, extension participation and risk orientation were significantly associated. The highest degree of association was between extension participation and communication scores. It is but natural that such association is reflected given the underpinning behavior of such respondents. The association with these factors was moderate except for extension participation. However, it is to be noted that veterinary hospitals ranked moderately when respondents were asked about sources of information utilized (table-10). The findings are in conformity with the results of Singh *et al.* (2016), who after a study on information needs of dairy farmers of Punjab reported that the age of farmers, experience in dairy farming, herd size owned and membership of dairy farming related organisations have a significant relation with their information needs. Yet, the need to further study the communication behavior of the respondents and the factors affecting it is once again emphasized as pointed out earlier in the chapter.

5.7 Background profile of veterinary professionals

The study reveals that a majority of the veterinary professionals were young to middle aged, male, post graduate in general. Surprisingly, many reportedly never participated in any zoonoses related training. Less than five per cent professionals participated in more than two trainings related to zoonosis. Similarly, Sandika (2006) and Ratnayake (2012) in their studies reported that very less numbers of professionals had ever received trainings. Ratnayake (2012) conducted study in eleven selected districts in Andhra Pradesh and further found that majority of the VASs were male and belonging to young age group. Similarly, in a study in Punjab covering male respondents in majority, Singh *et al.* (2017) also reported that majority of veterinary officers were belonging to age group of 25-35 years and having 1 to 10 years of service experience. Likewise, majority of male respondents was found in studies conducted by Sandika (2006), Agrawal and Agrawal (2014) and Goyal *et al.* (2018b).

5.8 Attitude of veterinary professionals towards animal hygiene

As outlined earlier in the previous chapter, a majority of veterinary professionals were having moderately favourable to strongly favourable attitude towards animal hygiene. Contrarily, Kimman *et al.* (2013) have earlier argued that the attitude towards risks associated with livestock production is sometimes even somewhat too lax or too little among professionals working in the livestock industry. It is possible that although the veterinarians favourable inclined towards animal hygiene yet they are easy with the risk associated. It is to be noted that the perception of zoonotic diseases risks in terms of public health is slightly on a different landscape with other intervening variables like individual risk orientation at play. Yet, it is quite encouraging to note that a large majority of veterinarians were having favourable inclination towards animal hygiene. But how much efforts they are able to put in to translate this favourable attitude for farmers capability enhancement remains to be ascertained. Therefore, it is suggested that further studies to assess the role of veterinarians in supporting farmers and the difficulties faced by them be undertaken. As has been pointed out earlier, the changing landscape of livestock production and rising mobility together with longer market chains are posing threats never seen in the past. The threat of zoonotic diseases being contracted and their spread is significantly higher now. In such a situation, the role of veterinarians in educating the farmers, detecting such diseases and responding quickly to such threats is vital.

The respondents were categorized into three categories of attitude favourableness based on their total scores (table-18). Only a smaller percentage of veterinary professionals were having not so favourable attitude towards animal hygiene. It can be seen that age, higher qualification and experience were significantly. Perhaps there is a need to focus on continuing veterinary education which will not only reinforce scientific knowledge but also help improve favourable attitude development.

5.9 Relationship between attitude scores of veterinary professionals and their personal attributes

5.9.1 Relationship between attitude scores of veterinary professionals and their age

It can be seen that the younger veterinary professionals scored highest in terms of attitude scores as compared to other two categories. This clearly underlines the need for earlier proposition that there is need to lay stress on continuing veterinary education.

5.9.2 Relationship between gender and attitude scores of respondents

The results indicate that female respondents were having more favourable attitude towards animal hygiene than the male respondents. Feminist writers have argued that women's views of animals are more caring, affectionate and egalitarian than those of men (Adams 1994), an opinion which is supported to some extent by empirical data from a number of psychological studies which consistently show that women have greater concern for the welfare of animals (Herzog and others 1991, Furnham and Heyes 1993) and greater emotional empathy with animals (Kellert and Berry 1987, Hills 1993). It is naturally expected that female veterinary professionals would have favourable attitude towards animal hygiene. However, such a correlation was not seen in the present study given the small sample size of female respondents.

5.9.3 Attitude scores of respondents based on their education level

The veterinary professionals with Post Graduate degrees scored higher. Ratnayake and Gupta (2014) in their studies also found positive association between the educational qualification and the role performance of VASs and argued that higher in education might have provided good opportunity to gain knowledge and performed better which might be the reason for positive impact on performance. It is probable that higher education reinforces the belief in the science of animal husbandry.

5.9.4 Attitude scores of respondents based on their service experience

Statistical comparison between the attitude scores of professionals having low experience and high experience yielded significant differences. The veterinary professionals with lesser service experience were having more favourable attitude towards animal hygiene when compared with those with higher service experience.

5.9.5 Attitude scores of respondents based on their participation in any zoonosis related training

The veterinary professionals exhibited more favourable attitude (table-19) than those who have never participated in zoonoses related training programme. It may seem to indicate that the trainings have had a negative impact on the attitude of the veterinarians towards animal hygiene. But it is quite possible that veterinary professionals with longer service experience are more likely to have attended any training. This might have contributed to the observed differences. Still, there is perhaps a need to qualitatively improve such trainings by emphasizing on the motivation part.

5.9.6 Attitude scores of respondents based on their frequency of participation in zoonosis related trainings

Higher attitude scores were obtained by respondents with extremely low participation in zoonosis related trainings. It has been proposed in the foregoing section that there is need to qualitatively improve the trainings. There is need to have regular continuing veterinary education programme not only to reinforce professional skills and knowledge but to help imbibe advances in the field of science which is expanding rapidly.

Findings and suggestions:

1. The knowledge level of respondents about the zoonoses prevention is moderate. There is need to take up this part more consistently in the regular extension programmes given the lack of focus as of now. This will also help improve knowledge level of farmers in general.
2. There is scope to improve extension contact frequency and younger farmers should be focused in such efforts as their knowledge scores were relatively poor.
3. The communication behavior of respondents is complex and poorly understood. Further studies to uncover the underpinnings of their communication behavior are suggested.

4. There is lack of extension contact frequency between farmers and veterinarians. The respondents were found seeking information more frequently from progressive and other farmers than the veterinary staff. Efforts should be made to fill this gap by encouraging farmers to frequently interact with veterinary staff.
5. Adoption of HACCP approach to identify and intervene by way of educating farmers should be made. It will help quality and safety of produce significantly.
6. The veterinarian in general are favourably disposed towards the idea of animal hygiene. However, regular continuing veterinary education will help improve not only their knowledge but will motivate them to work with farmers with greater enthusiasm.
7. The household respondents more likely in mixed farming environment have different knowledge and communication behavior than the commercial respondents. The extension agencies and public health experts should treat both of these categories as different and come up with different extension strategies for them.
8. Further studies to explore the farmer and veterinarians interface in terms of zoonoses prevention are suggested. As of now there is little knowledge about such an interaction.

CHAPTER-VI

SUMMARY AND CONCLUSION

India has emerged as the largest milk producing country with first rank in the world in milk production. Demand has grown, driven by urbanization, population growth, trade and high expenditure elasticities for livestock products such as milk. There are growing issues throughout the world of ensuring a food supply safe from food-borne hazards and protecting people against transfer of novel diseases. These changes have arisen from the growth of the global human population and the extreme pressures it has placed on the environment, particularly at the interface between human food production systems and natural ecosystems. Besides other sources, pathogens circulating in animal populations can threaten both animal and human health, and thus both the animal and human health sectors have a stake in, and responsibility for, their control. Various elements are responsible for emergence of these pathogens including continuous increase in human and animal population bringing increasingly larger numbers of people and animals into close contact, the infectious agent itself undergoing genetic drift and shift enhancing the virulence, adverse climatic changes, reduction in travel time making it possible to circumnavigate the globe in less than the incubation period of most infectious agents and ecological changes caused by human activities like deforestation, urbanization and dam building, and alteration of immune status of population. India possesses a favourable environment for the transmission of communicable diseases between man and animals. Measures aimed at preserving cleanliness, preventing pathogen build-up and breaking possible pathways of transmission are essential in the management of any modern farming enterprise, regardless of the species or the farming system. To confront the threats of emerging zoonotic diseases, much can be done by education, and in particular by improving the awareness of different health professionals, and facilitating communication and collaboration between veterinary, public health, agricultural and national policy making personnel. It is important that dairy personnel or farmer have a clear understanding of the farm's policy and works instructions, and have the right attitude to personal and operational hygiene. It has been opined that when dealing with emerging zoonoses, the first priority is seeking knowledge how to

deal with the zoonosis. This knowledge is the input of a control strategy. However, empirical information about the farmers' knowledge and behaviour in preventing zoonoses is lacking. Further, it has been argued that many of human health workers and veterinarians may not appreciate the relevance or importance of zoonoses even though they have theoretical understanding of the threat. There is lack of empirical information about attitude of veterinarians towards the zoonotic diseases in India. In this backdrop it was felt necessary that there is an urgent need to conduct a systematic study in this important area of growing concern. Therefore, the present study was conducted with the following specific objectives:

- 1.) To assess the knowledge of dairy farmers about prevention of zoonotic diseases.
- 2.) To ascertain the communication behaviour of dairy farmers regarding prevention of zoonotic diseases.
- 3.) To document zoonotically undesirable practices being followed in the milk production systems.
- 4.) To develop a scale to measure attitude of the veterinary professionals towards animal hygiene.
- 5.) To measure the attitude of veterinary professionals towards animal hygiene.

The study was conducted in Haryana. Two districts namely Hisar and Jind were selected. Multistage random sampling was followed for the selection of respondents. A total of 160 dairy farmers constituted the sample for the study. Similarly, 10 commercial dairy farm owners from each district were selected randomly. Finally, 34 veterinarians from each district were chosen randomly using simple lottery method. The data were collected with the help of structured interview schedule during 2017-18. Thirteen relevant independent variables were included in the study. Knowledge of the respondents was assessed based on experts opinion prepared in the form of recommendation and contradicted practices. These recommendations in the form of enlisted Do's and Don't were operationalized by allotting equal mark for each item. A score of 1 was assigned for correct response and a zero was assigned to incorrect response. There were 68 items in all thus making the possible knowledge score range from 0 to 68. For assessing the communication behavior of the farmers a scale was used. This was assessed in terms of 'from where the information was sought', 'how much information was sought' and 'how frequently information was sought'. For documenting the undesirable practices of

respondent's observation method was used. Attitude in this study was conceptualized as the positive or negative disposition of an individual associated with the psychological object of animal hygiene. A scale was developed for measuring the attitude of veterinarians. Summated ratings method was followed for construction of scale. The scale contained 22 items in all. The reliability of scale was 0.87.

The observed age of the respondents was 18-83 years thus indicating representation of all age groups with the mean age being 42.83 years. A large majority of respondents were having educational qualification of middle class with a majority having dairy farming experience between 16 to 18 years. Further, a majority of respondents were of general caste category. Their social participation was poor. Most of the respondents were holding 1 to 5 acre of land. Respondents' scores varied from low to medium in different variables like experience in dairy farming, mass media exposure and extension participation while scores of variables like herd size, risk orientation and scientific orientation varied from medium to low.

The knowledge scores obtained by the respondents varied considerably. The minimum score obtained was the 28 with the highest being 68. It is argued that the farmers' knowledge seeking behavior plays an important role. Further, there were significant differences between commercial and household farmers. More of commercial farmers scored high when compared to household dairy farmers. It is proposed that mass media can be effectively utilized for disseminating information about such threats.

It was observed that as high as 60 per cent of dairy farmers scored moderately in terms of communication behaviour. This seems to indicate that the respondents' communication behavior was significantly varying. A majority of dairy farmers used different sources moderately to get information. This seemingly indicates that farmers were seeking information about dairy animals. The sources utilized by the respondents most of times were other and progressive farmers followed by Veterinary hospital, Neighbours/ Friends, Training, etc. This indicates that farmers in general want to emulate progressive farmers. It appears that a majority of farmers look for legitimized information in simple terms which largely is provided by such progressive farmers. Respondents were seeking most of the information on Selection criteria for disease free animal followed by Storage of feed, Supplemental feed preparation and Health care. On the other hand, information in areas like routine feeding, Breeding

services and Supplemental feed preparation was least sought. A majority of the respondents were classified in medium category in terms of frequency with which farmers seek information in different activities. It is suggested that further studies to understand the communication behavior of farmers are needed.

A majority of the observed dairy farms were having permanent shed, but less than half of these were having cemented floor. More than half the numbers of observed dairy sheds were located in areas with a foul smell. A significantly large majority of farmers were allowing animals in the shed after/before milking. Less than half the number of dairy farmers were found to keep the floor of the shed clean and dry. Almost half the numbers of dairy farmers were using regular plastic containers. Not a single dairy farmer was found having milking machines at his/her dairy farm. Less than one third the number of dairy farmers were keeping their animals in a standing position after milking. It is suggested that the regular extension programmes should emphasize the need to maintain hygiene in and around farms.

A majority of veterinary professionals selected in the study were young to middle aged, male, post graduate in general. Surprisingly, many reportedly never participated in any zoonoses related training. A majority of veterinary professionals were having moderate to strongly favourable attitude towards animal hygiene. The threat of zoonotic diseases being contracted and their spread is significantly higher now. In such a situation, the role of veterinarians in educating the farmers, detecting such diseases and responding quickly to such threats is vital. Need to focus on continuing veterinary education is emphasized.

The study concludes that there is need to take up this part more consistently in the regular extension programmes. There is scope to improve extension contact frequency and younger farmers should be focused in such efforts as their knowledge scores were relatively poor. The communication behavior of farmers is complex and poorly understood. The farmers were found seeking information more frequently from progressive and other farmers than the veterinary staff. Efforts should be made to fill this gap by encouraging farmers to frequently interact with veterinary staff. Further studies to explore the farmer and veterinarians interface in terms of zoonoses prevention are suggested.

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ANNEXURE-I

Agreement scores of judges on the statements collected for attitude scale.

Sr. No.	Statements	Positive		Un-decided		Negative		Selected/Rejected
		Frequency	%	Frequency	%	Frequency	%	
1	I think quality of the environment where animals are due to live matters regarding animal health safeguard	27	77.14	4	11.43	4	11.43	Rejected
2*	I think there is no interaction between abiotic and biotic factors of environment and the domestic animal	9	25.71	3	8.57	23	65.71	Rejected
3	Farm structures play its role in preventing outbreaks of diseases	33	94.29	1	2.85	1	2.85	Selected
4	Veterinary services that maintain the well being of both animal and man in a farm environment are worth consideration	34	97.14	0	0	1	2.85	Selected
5	It is appropriate to say that there is relationship between an animal and its living environment on the farm	34	97.14	0	0	1	2.85	Selected
6	The system for the identification and registration of animals should be improved for public health	29	82.85	3	8.57	3	8.57	Selected
7	The Veterinary Information System needs to be improved	33	94.28	2	5.71	1	2.85	Selected
8*	Unprotected animals can also be used for experimental purposes.	13	37.14	10	28.57	12	34.28	Rejected
9	Animal diseases cause social, economic and environmental damage	33	94.29	2	5.71	1	2.86	Selected
10	Animal diseases threaten human health	31	88.57	2	5.71	2	5.71	Selected
11	Increased globalisation of trade and animal product movements create new disease risks	31	88.57	1	2.86	3	8.57	Selected
12*	I think therapy of disease, in comparison to their prevention is economical	7	20.00	9	25.71	19	54.28	Rejected
13*	Milk quality remains unaffected by housing conditions	4	11.43	4	11.43	27	77.14	Rejected
14*	In my opinion bovine mastitis doesn't pose health risk for consumers	4	11.43	0	0	31	88.57	Selected
15*	It is ridiculous to relate cooking utensils (used in the food industry) to animal hygiene	7	20.00	8	22.85	20	57.14	Rejected

16	I think only clean water should be provided to farm animals	33	94.28	0	0	2	5.71	Selected
17*	I don't find any need of keeping surroundings of water sources up and protected	2	5.71	2	5.71	31	88.57	Selected
18	I often discuss with other professionals about animal hygiene	26	74.28	6	17.14	3	8.57	Rejected
19	I wish I could change other people to adopt good animal hygiene conditions.	33	94.28	2	5.71	0	0	Selected
20	I would like to adopt animal hygiene requisites, even if it costs profit loss to me.	24	68.57	6	17.14	5	14.28	Rejected
21	Improvement in the state of balance between animals and environment is important	35	100	0	0	0	0	Selected
22	I consider animal hygiene just as a prophylaxis postulating prevention of diseases	26	74.28	3	8.57	6	17.14	Rejected
23	I think that wholesome food of animal origin can be produced from healthy animals only.	34	97.15	1	2.85	0	0	Selected
24*	For me, monitoring of latent food-borne pathogens is wastage of time	3	8.57	1	2.85	31	88.57	Selected
25	Prevention is better than cure	35	100	0	0	0	0	Selected
26*	Being veterinary professionals we should not be much concerned about ensuring human health protection	5	14.28	2	5.71	28	80.00	Selected
27	In my opinion boots and clothes for visitors should be available on every animal unit	33	94.29	2	5.71	0	0	Selected
28*	In my opinion airborne pathogens should not be considered as risks in the farm environment	3	8.57	2	5.71	30	85.71	Selected
29*	It is ridiculous to consider heavy metals and organic pollutants from immissions as risks in the farm environment	6	17.14	4	11.43	25	71.42	Rejected
30	In my view, contaminations by improper processing, handling, storage and transport pose risks in the feeds	31	88.57	2	5.71	2	5.71	Selected
31*	Elimination of the antagonistic flora during treatment of animals is neglectable	6	17.14	12	34.28	17	48.57	Rejected
32*	Application of drugs is more important than its being licensed or unlicensed	8	22.85	9	25.71	18	51.43	Rejected
33	In my opinion, hygienic safe treatment of effluents is necessary	34	97.14	1	2.86	0	0	Selected

34	I would prefer construction of animal houses with materials supporting hygienic measures	35	100	0	0	0	0	Selected
35*	Construction of animal houses should be done economically irrespective of hygiene considerations	5	14.28	3	85.71	27	77.14	Rejected
36*	In my opinion, cleaning and disinfection practices in animal houses should be carried out as per convenience of time	10	28.57	4	11.43	21	60.00	Rejected
37	I advice to monitor hygienic status of the building regularly	35	100	0	0	0	0	Selected
38*	I think cleaning and disinfection of outdoor hard surfaces is not much important regarding animal hygiene	6	17.14	0	0	29	82.86	Selected
39*	The consequences of not following strict hygienic rules are negligible	2	5.71	1	2.85	33	94.28	Selected
40*	I think scope of animal hygiene is limited to animal disease prevention	7	20.00	2	5.71	26	74.28	Rejected
41	Pre-harvest food safety is a new challenge that the farming community is increasingly facing	27	77.14	7	20.00	1	2.85	Rejected
42	In my opinion, environmental protection and waste management is also a challenge for the farming community	32	91.43	2	5.71	1	2.85	Selected
43	The basic rules of biosecurity must be taught under animal hygiene	34	97.14	1	2.86	0	0	Selected
44	Health and welfare of animals and humans are related to each other	34	97.14	1	2.86	0	0	Selected
45	There is need of having good knowledge about safe manure removal, storage and land application	34	97.14	1	2.86	0	0	Selected
46	Animal hygiene is a precondition for the sustainability of the animal husbandry systems	32	91.43	3	8.57	0	0	Selected
47*	Approach of animal hygiene should be limited to typical food delivering animals	11	31.43	3	8.57	21	60.00	Rejected
48	In my opinion, environmental problems are enhanced by high animal densities.	21	60.00	10	28.57	4	11.43	Rejected
49*	It is convenient to keep farms and residential areas closer to each other	6	17.24	5	14.29	24	68.57	Rejected
50*	Investigating the fate of the drugs in the environment is wastage of time	4	11.43	5	14.29	26	74.28	Rejected
51*	Comparing different production systems regarding environmental risk is a very	6	17.24	8	22.86	21	60.00	Rejected

	hectic and neglectable necessity							
52	Acceptance by the trade partners of products originating from vaccinated animals should be promoted	26	74.28	5	14.29	4	11.43	Rejected
53*	I believe that effect on performances remains minor by presence of sub-clinical disease within livestock systems	7	20.00	12	34.29	16	45.71	Rejected
54	It is rational to keep foot bath with disinfectant at the entry of the herd or a sanitary transition zone	33	94.28	1	2.85	1	2.85	Selected
55	I would recommend provision of farm-specific clothing and shoes for visitors in farms.	32	91.43	3	8.57	0	0	Selected
56	Animals should be bought after knowing its health status	35	100	0	0	0	0	Selected
57	In my opinion farmers should keep written records of all treatments of animals appropriately	35	100	0	0	0	0	Selected
58	Chemicals and veterinary medicines should be stored securely and dispose of responsibly	35	100	0	0	0	0	Selected
59	We should consider animal behaviour when developing farm infrastructure	33	94.29	2	5.71	0	0	Selected
60*	The code and conduct for following the proper animal hygiene in the farm is complicated	13	37.14	6	17.14	16	45.71	Rejected
61*	I feel that the amount required to convert the farm to disease risk free is much higher	15	42.86	5	14.28	15	42.86	Rejected
62*	I will have the problem in sourcing and purchasing inputs required to keep farm disease free	17	48.57	4	11.43	14	40.00	Rejected
63*	I am not right kind of person to convince farmers of locality to adopt proper animal hygiene practices.	6	17.14	5	14.29	24	68.57	Rejected
64*	Strict adherence to proper animal hygiene practices will give less profit to dairy farm	6	17.14	4	11.43	25	71.43	Rejected
65*	Profits are more important for the farmers than the environmental issues	13	37.14	3	8.57	19	54.29	Rejected
66*	I will not recommend animal hygiene practices to the farmers	4	11.43	0	0	31	88.57	Selected
67*	Nature of farming practices has no role in ecological problem/environmental pollution	6	17.14	2	5.71	27	77.14	Rejected

* = Negative statement

ANNEXURE-II

Mean scores and differences of high and low groups of respondents.

Sr. No.	Statements	High Group Mean	Low Group Mean	Difference
1	Farm structures play its role in preventing outbreaks of diseases	4.82	4.24	0.59
2	Veterinary services that maintain the well-being of both animal and man in a farm environment are worth consideration	4.82	4.00	0.82
3	It is appropriate to say that there is relationship between an animal and its living environment on the farm	5.00	4.59	0.41
4	The system for the identification and registration of animals should be improved for public health	4.88	4.18	0.71
5	The Veterinary Information System needs to be improved	4.71	4.35	0.35
6	Animal diseases cause social, economic and environmental damage	5.00	4.35	0.65
7	Animal diseases threaten human health	4.88	4.00	0.88
8	Increased globalisation of trade and animal product movements create new disease risks	4.88	4.06	0.82
9*	In my opinion bovine mastitis doesn't pose health risk for consumers	4.82	3.35	1.47
10	I think only clean water should be provided to farm animals	4.82	4.00	0.82
11*	I don't find any need of keeping surroundings of water sources up and protected	4.24	2.53	1.71
12	I wish I could change other people to adopt good animal hygiene conditions	4.47	4.24	0.24
13	Improvement in the state of balance between animals and environment is important	4.65	3.82	0.82
14	I think that wholesome food of animal origin can be produced from healthy animals only	4.88	3.88	1.00
15*	For me, monitoring of latent food-borne pathogens is wastage of time	4.88	2.41	2.47
16	Prevention is better than cure	4.94	4.71	0.24
17*	Being veterinary professionals we should not be much concerned about ensuring human health protection	4.82	2.76	2.06
18	In my opinion boots and clothes for visitors should be available on every animal unit	4.53	3.59	0.94
19*	In my opinion airborne pathogens should not be considered as risks in the farm environment	4.59	3.18	1.41
20	In my view, contaminations by improper processing, handling, storage and transport pose risks in the feeds	4.88	4.12	0.76
21	In my opinion, hygienic safe treatment of effluents is necessary	4.88	4.12	0.76

22	I would prefer construction of animal houses with materials supporting hygienic measures	5.00	4.18	0.82
23	I advise to monitor hygienic status of the building regularly	4.94	3.59	1.35
24*	I think cleaning and disinfection of outdoor hard surfaces is not much important regarding animal hygiene	4.71	2.41	2.29
25*	The consequences of not following strict hygienic rules are negligible	4.94	3.18	1.76
26	In my opinion, environmental protection and waste management is also a challenge for the farming community	4.88	4.18	0.71
27	The basic rules of biosecurity must be taught under animal hygiene	4.82	3.94	0.88
28	Health and welfare of animals and humans are related to each other	4.88	3.82	1.06
29	There is need of having good knowledge about safe manure removal, storage and land application	4.76	4.06	0.71
30	Animal hygiene is a precondition for the sustainability of the animal husbandry systems	4.94	4.06	0.88
31	It is rational to keep foot bath with disinfectant at the entry of the herd or a sanitary transition zone	4.94	4.00	0.94
32	I would recommend provision of farm-specific clothing and shoes for visitors in farms	4.76	3.94	0.82
33	Animals should be bought after knowing its health status	5.00	4.29	0.71
34	In my opinion farmers should keep written records of all treatments of animals appropriately	4.88	4.41	0.47
35	Chemicals and veterinary medicines should be stored securely and dispose of responsibly	5.00	4.24	0.76
36	We should consider animal behaviour when developing farm infrastructure	4.35	4.00	0.35
37*	I will not recommend animal hygiene practices to the farmers	4.53	2.76	1.76

* = Negative statement

ANNEXURE-III

Final attitude scale:

Strongly disagree-SD, disagree-D, undecided-U, agree-A, strongly agree-SA

Sr. No.	Statements	SD	D	U	A	SA
1	Veterinary services that maintain the well-being of both animal and man in a farm environment are worth consideration					
2	Animal diseases threaten human health					
3	Increased globalisation of trade and animal product movements create new disease risks					
4*	In my opinion bovine mastitis doesn't pose health risk for consumers					
5	I think only clean water should be provided to farm animals					
6*	I don't find any need of keeping surroundings of water sources up and protected					
7.	Improvement in the state of balance between animals and environment is important					
8	I think that wholesome food of animal origin can be produced from healthy animals only					
9*	For me, monitoring of latent food-borne pathogens is wastage of time					
10*	Being veterinary professionals we should not be much concerned about ensuring human health protection					
11	In my opinion boots and clothes for visitors should be available on every animal unit					
12*	In my opinion airborne pathogens should not be considered as risks in the farm environment					
13	I would prefer construction of animal houses with materials supporting hygienic measures					
14	I advise to monitor hygienic status of the building regularly					
15*	I think cleaning and disinfection of outdoor hard surfaces is not much important regarding animal hygiene					
16*	The consequences of not following strict hygienic rules are negligible					
17	The basic rules of biosecurity must be taught under animal hygiene					
18	Health and welfare of animals and humans are related to each other					
19	Animal hygiene is a precondition for the sustainability of the animal husbandry systems					
20	It is rational to keep foot bath with disinfectant at the entry of the herd or a sanitary transition zone					
21	I would recommend provision of farm-specific clothing and shoes for visitors in farms.					
22*	I will not recommend animal hygiene practices to the farmers					

LALA LAJPAT UNIVERSITY OF VETERINARY AND ANIMAL SCIENCES

Department of Veterinary & Animal Husbandry Extension Education

INTERVIEW SCHEDULE

Title of the research:

“Zoonoses Risk – Perception of Dairy Farmers of Haryana”

Serial No. _____

Respondent No. _____ Name of Respondents _____

District _____ Block _____ Village _____

Date of interview _____

PART – I (General Information)

1) Age at the time of interview: _____ yrs.

2) Education qualification:

Illiterate (0)

Can read only (1)

Can read and write (2)

Primary (3)

Middle (4)

High school & 10+2 (5)

Graduate above (6)

3) Dairy experience: _____ yrs.

4) Type of Family

a) Joint (1)

b) Nuclear (2)

5) Social participation:

1.) No membership 1

2.) Member of an organization 2

3.) Member of more than one organization 3

4.) Office holders 4

5.) Wide public leader 5

6) Mass media exposure:

S.N.	Media	Extent Media of exposure		
		Regular	Occasional	Never
1.	Leaflet/ pamphlet on agric.			
2.	Farm magazines			
3.	Newspapers			
4.	Books on agriculture			
5.	Radio			
6.	Television			
7.	Video/film show			

7) **Caste :** _____

8) **Size of landholding:**

- Landless (0)
- Less than 1 acre (1)
- 1 to 5 acre (2)
- 6 to 10 acre (3)
- 11 to 15 acre (4)
- 16 to 20 acre (5)
- More than 20 acre (6)

9) **Herd size**

No	Type of Animal								Total
		Milch	Dry	Heifer above 1 year	Bull	Bullock	Female Calves	Male Calves	
1	Cow								
	Indigenous								
	Cross Breed								
2	Buffalo								

10) **Extension participation:** Have you participated in any of the following extension activities during the last three year? Yes / no

S. No.	Activities	Yes	No
1	Have you conducted any demonstration on your farm?		
2	Did you have discussion with extension workers?		
3	Have you participated in extension meeting?		
4	Have you seen demonstration plot of neighbor		
5	Have you participated in Krishimela/Farmers day?		
6	Have you visited to the agricultural exhibition?		
7	Do you read extension publication?		
8	Other (specify)		

11) **Risk orientation:**

S. No.	Risk orientation	SA	A	UA	DAS	DA
1	I am confident on my ability to take challenges for any type of risk in zoonosis prevention					
2	I don't like to use any risk creating methods in zoonosis prevention					
3	I am ready to bear risk in zoonosis prevention for high profit					
4	I like to take challenge in adopting costly methods in zoonosis prevention					
5	I like to follow only those methods which are successfully accepted by others farmers					
6	I feel people with in tented risk bearing capacity are always stepping the top					
7	I feel fear that something unexpected might damage my plans of adopting new technology in zoonosis prevention					
8	I can minimize the consequence of risk in zoonosis prevention in dairy by proper planning					
9	I can reduce the effect of any risk in zoonosis prevention in dairy by proper execution					
10	I feel that accepting realistic risk in dairy is not always hazardous resolution					

12) Scientific orientation:

No.	Statements	SA	A	UN	DA	SDA
1	Scientific methods of dairy farming always confuse me					
2	Quality production in animal husbandry is possible through use of science					
3	Adoption of new scientific animal husbandry methods is problematical process					
4	Scientific methods of dairy farming are very impractical					
5	Profitable animal husbandry production is possible through intervention of science and technology					
6	Application of science in dairy farming means wastage of time					
7	I like to prefer scientific methods of dairy farming					
8	I believe in traditional method of dairy farming					
9	In my opinion use of science in animal husbandry means fruitful result					
10	Sustainable animal husbandry is possible through application of science					
11	Scientific animal husbandry methods increase production					
12	Scientific animal husbandry methods damage ecology					
13	Scientific animal husbandry methods require high infrastructural facilities					
14	Application of science in dairy farming means savings of money					

13) Economic motivation:

S No.	Statement	A	UD	DA
a)	A dairy farmer should work towards more milk yield and economic profits			
b)	The most successful dairy farmer is one who makes the more profit			
c)	A dairy farmer should try any new idea, which may earn him more money.			
d)	A dairy farmer should keep crossbreed cows/ improved buffaloes to increase monetary profits			
e)	It is difficult for the dairy farmer's children to make good start unless he provides them with economic assistance			
f)	A dairy farmer must earn his living but the most important thing in life cannot be defined in economic terms			

PART – II

Information seeking behavior

Information source and its use pattern:

A).Indicate how frequently you use the following sources to get information on Zoonoses prevention?

Sr. No.	Information sources	Frequency of use		
		Always (2)	Sometimes (1)	Never (0)
a)	Veterinary hospital			
b)	Progressive farmers			
c)	Neighbours/Friends			
d)	Other farmers			
e)	Training, Demonstration & Field days			
f)	Others (specify)			

B). How much information on Zoonoses prevention do you seek in the following activities?

Sr. No.	Activities	How much new information you wish to get		
		All information (2)	Some information (1)	No information (0)
a)	Selection criteria for dairy animal			
b)	Feeding			
c)	Watering			
d)	Supplemental feed preparation			
e)	Storage of feed			
f)	Health care			
g)	Breeding services			

C).How frequently do you seek information on Zoonoses prevention in the following activities?

Sr. No.	Activities	Frequency of seeking information			
		Mostly (3)	Sometimes (2)	Rarely (1)	Never (0)
a)	Selection criteria for dairy animal				
b)	Feeding				
c)	Watering				
d)	Supplemental feed preparation				
e)	Storage of feed				
f)	Health care				
g)	Breeding services				

PART – III

Knowledge about prevention of zoonotic diseases

Do's for zoonotic disease prevention

Sr. No.	Statements	Correct	Incorrect
1	Vaccination for communicable diseases is followed regularly		
2	AI is preferred over natural breeding		
3	A veterinarian is called immediately if the abortion is seen		
4	Wound be washed immediately in running water in case of dog bite		
5	It is necessary to clean the wound gently with bath soap in case of dog bite		
6	Veterinarian is consulted for treatment as soon as sickness of animal is observed		
7	Post-bite vaccination schedule be followed in suspected cases		
8	Isolation of infected is done immediately after calving/abortion		
9	The aborted foetus, placenta, contaminated bedding, feed etc, are buried (at least 4 feet deep) after a liberal sprinkling of lime		
10	When the animal is in isolation, disinfecting the lochial discharges is done daily		
11	Disinfect using 1-2% NaOH or 5% sodium hypochlorite (bleach) solution		
12	Disinfection is done till the lochial discharges cease (usually by 10 –15 days)		
13	Animal houses are to be treated with acaricides and other chemicals to prevent vector infestation		
14	Premises are to be kept dry and clean as much as possible		
15	Rodent control prevents spread of zoonotic disease		
16	Culling of infected animals is adopted to prevent spread of zoonotic infections		
17	Purchasing of new animals is done only from non-infected farm		
18	New animals are purchased only after ensuring their zoonotic disease free status		
19	Quarantine newly purchased animals for at least 14 days before mixing them with herd		
20	Only disease free animals are inducted to farm		
21	Regular testing of animals is carried out		
22	Regular tick control is done		
23	Hands are washed with soap before having food		
24	Animals in last trimester of pregnancy kept in separate pens		
25	Thorough cleaning and sanitizing is practiced of the materials and equipments used for handling milk		
26	All animals which are 6 months and above of age are vaccinated		
27	Lime be sprinkled over carcass at the time of burial		
28	Animal shed is kept well ventilated and lighted		
29	Sprinkle water for cleaning milk sheds before one hour of milking		
30	Protective wears are to be used to prevent spread of zoonotic diseases		

31	Animals must be cleaned before milking		
32	Brush the animals daily		
33	Udder is cleaned with luke warm water and/or with towel soaked in bleaching powder or KMnO ₄ before and after milking		
34	Diseased animal is milked at last		
35	Area where animals are kept is cleaned before milking in the morning, evening and once at noon		
36	Proper boiling and pasteurization of milk is carried out		
37	Before and after handling animal proper hand washing is necessary		
38	Face mask is to be applied while handling animals		
39	Deworming are to be carried out at regular interval		
40	Proper drainage is to be maintained around animal shed		
41	Gloves are be used when handling dirty laundry, cleaning farm premises and contaminated equipment and environmental surfaces in animal areas		
42	Gloves are changed between examinations of individual animals or animal groups		
43	Gloves are removed immediately after use		
44	Hand washing is performed or alcohol based hand rubs are to be used immediately after glove removal		
45	Equipment and surfaces are to be cleaned and disinfected between uses or whenever visibly soiled		
46	Milk of treated animals is to be discarded for three days		
47	Animal movement is to be controlled to prevent spread of zoonotic diseases		

Don'ts for zoonotic disease prevention

Sr. No.	Statements	Correct	Incorrect
1	Poor ventilation is to be avoided in farms		
2	Overcrowding of animals is avoided in sheds		
3	Animal diagnosed with zoonotic disease is not slaughtered		
4	Aborted foetus, placenta, amniotic fluid, other discharges and dead bodies not be disposed by dragging		
5	After isolating the aborted animal, disinfection of the shed is not delayed		
6	Disposal of the aborted foetus, placenta, amniotic fluid and other discharge is not delayed		
7	Infected material is not be handled bare handed.		
8	Contact with contaminated urine or uterine contents are avoided		
9	Avoid bathing in water bodies contaminated with animal urine		
10	Close contact with cattle is avoided		
11	For milking or treating or handling the animal, a person with any injury is not allowed without protection		
12	Milk and meat of diseased animal is avoided for human consumption		
13	Entry of persons are to be restricted in animal shed		
14	Sick animals are kept away from rest of the herd		

15	Isolation room supplies are not to be removed for use elsewhere		
16	Children or pregnant women are not allowed to handle diseased animals		
17	Do not handle the dung of animals with bare hands		
18	Aborted foetus, placenta, amniotic fluid and other discharge are not to be handled bare handed		
19	Do not consume raw milk		
20	Taking bath in ponds common to all animals is avoided		
21	Do not practice incomplete milking		

PART – IV

APPENDIX V: -OBSERVATION SCHEDULE

ON-SITE OBSERVATIONAL INSPECTION OF PRACTICES IN DAIRY FARM

a) Preparation

Sr. No.	Step of The Dairy Handling Process	Practices	Yes	No	Remarks
1	Environment	A permanent shed.			
		Cemented floor.			
		Sheds is placed in areas with a foul smell.			
		Animals are allowed in the shed after/before milking.			
		The shed be thoroughly cleaned after every milking.			
		When not in use, the floor of the shed be kept clean and dry.			
2	Equipment	Aluminium or stainless steel cans are used for milking and storing milk.			
		Regular (non-Mazzi) plastic containers used.			
		A separate “strip cup” for testing cows for mastitis prior to milking is kept.			
		Clean all utensils as soon as possible after milking.			
		Utensils and containers- Rinse with cold water			
		Scrub with a brush using hot water and detergent (un-perfumed liquid soap).			
		Rinse with cold water.			
		Place on a rack to dry in the sun.			
		Store containers and utensils in a safe, clean and well-ventilated room when not in use.			
		Clean all containers immediately after emptying milk.			
		Milking machines - Rinse with cold water.			
		Circulate some hot water with detergent through the system.			
		Rinse with hot water			

2.) Milking

Sr. No.	Step	Practices	Yes	No	Remarks
1	Animal health and hygiene	Vaccinate animals against zoonotic diseases.			
		Check animals periodically for all types of contagious diseases.			
		When a cow is suspected being sick, contact a qualified veterinary practitioner immediately.			
		Milk is consumed and/or sold from cow under antibiotic therapy.			
2	Personal hygiene	Person involved in milking cows is healthy and clean.			
		Fingernails are short			
		People with long hair cover their heads.			
		Smoking during milking time.			
3	Techniques for milking cows	Wash hands thoroughly with soap and clean water before milking.			
		After washing hands dry with a clean towel immediately before milking.			
		Wash the udder with warm clean water with disinfectant using a clean towel.			
		Dry udder using a dry towel.			
		Before milking, test for mastitis using a strip cup.			
		If mastitis is detected, then that cow be milked last.			
		Once begin, milk quickly and completely, without interruption.			
		When milking, be sure to squeeze the teat.			
		When finished, “strip” the animal to get the last drops out of the udder.			
		After an animal is done, dip the teats in a teat dip.			
		Make sure that the animal remains in a standing position for at least one hour after milking.			

3.) Handling and storage

Sr. No.	Step	Practices	Yes	No	Remarks
1	Handling	When transferring milk between containers, pour the milk directly from one container into the other instead of scooping it with a cup or bucket.			
2	Storage	Filter milk (Use a white filter cloth or strainer) immediately after milking and prior to storage.			
		Disinfect, wash and dry the cloth/strainer after use.			
		Store milk without chemicals in a cool, clean room set aside for milk only.			
		Store milk at high temperatures.			
		Mix warm (morning) milk with cool (evening) milk.			
		If this is not possible, cool the warm milk by placing the container in cold water before mixing.			
		Deliver milk to the market as soon as possible, preferably in the cool morning or evening.			
3	Cooling Milk in the Shade / in a cold water bath or stream	Loosen the lids of the cans to allow warm air to escape.			
		Keep the lid closed if there are insects or dust in the area, to avoid contamination.			
4	Heating milk before storage (pasteurization)	Immerse the milk can in boiling water for at least 30 minutes.			

LALA LAJPAT UNIVERSITY OF VETERINARY AND ANIMAL SCIENCES

Department of Veterinary & Animal Husbandry Extension Education

INTERVIEW SCHEDULE/QUESTIONNAIRE

Title of the research:

“Zoonoses Risk – Perception of Dairy Farmers of Haryana”

Objective: To measure the attitude of veterinary professionals towards Animal Hygiene.

Serial No. _____

Date : _____

Name of the District/Block: _____

Viillage (Posting): _____

Respected sir/ma'am,

Kindly find enclosed herewith a set of statements relating to animal hygiene. You are requested to indicate your agreement or disagreement by marking in the appropriate column. This is part of research study and will be used for this purpose only.

Part-I (General Information)

1. Socio-personal profile

a. **Name of the Respondent** : _____

b. **Age (in years)** : _____

c. **Gender** (Male / Female) : _____

d. **Educational Qualifications** : _____

5. **Service Experience**: _____ Years _____ Months

6. **Training Received**: Have you participated in any training on zoonosis/zoonotic diseases? **Yes/No**

If yes, then indicate number of training received till now _____

Part-2 (Attitude Statements)

Strongly agree (SA), Agree (A), Undecided (UN), Disagree (DA), Strongly Disagree (SDA)

Sr. No.	Statements	SA	A	UN	DA	SDA
1	Veterinary services that maintain the well-being of both animal and man in a farm environment are worth consideration					
2	Animal diseases threaten human health					
3	Increased globalisation of trade and animal product movements create new disease risks					
4*	In my opinion bovine mastitis doesn't pose health risk for consumers					
5	I think only clean water should be provided to farm animals					
6*	I don't find any need of keeping surroundings of water sources up and protected					
7	Improvement in the state of balance between animals and environment is important					

8	I think that wholesome food of animal origin can be produced from healthy animals only					
9*	For me, monitoring of latent food-borne pathogens is wastage of time.					
10*	Being veterinary professionals we should not be much concerned about ensuring human health protection					
11	In my opinion boots and clothes for visitors should be available on every animal unit					
12*	In my opinion airborne pathogens should not be considered as risks in the farm environment					
13	I would prefer construction of animal houses with materials supporting hygienic measures					
14	I advise to monitor hygienic status of the building regularly					
15*	I think cleaning and disinfection of outdoor hard surfaces is not much important regarding animal hygiene					
16*	The consequences of not following strict hygienic rules are negligible					
17	The basic rules of biosecurity must be taught under animal hygiene					
18	Health and welfare of animals and humans are related to each other					
19	Animal hygiene is a precondition for the sustainability of the animal husbandry systems					
20	It is rational to keep foot bath with disinfectant at the entry of the herd or a sanitary transition zone					
21	I would recommend provision of farm-specific clothing and shoes for visitors in farms					
22*	I will not recommend animal hygiene practices to the farmers					

* = Negative statement

ABSTRACT

Title of thesis	: Zoonoses Risk – Perception of Dairy Farmers of Haryana
Name of degree holder	: Rakesh Ahuja
Admission No.	: 2015V28D
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The present study was conducted on 180 dairy farmers selected from eight villages of two districts viz. Hisar and Jind of Haryana to assess their knowledge about prevention of zoonotic diseases. The attitude of veterinary professionals towards Animal Hygiene was also measured. The data were collected by holding personal interview with the dairy farmers and veterinary professionals during 2017-18. Knowledge of the respondents was assessed based on experts opinion prepared in the form of recommendation and contradicted practices. For assessing the communication behavior of the farmers' a scale was used. This was assessed in terms of from where the information was sought, how much information was sought and how frequently information was sought. For documenting the undesirable practices of respondent's observation method was used. A scale was constructed for measuring the attitude of veterinarians. Summated ratings method was followed for construction of scale. The scale contained 22 items in all. The reliability of scale was 0.86. The knowledge of the respondents varied considerably. The minimum score obtained was the 28 with the highest being 68. It was argued that the farmers' knowledge seeking behavior plays an important role. There were significant differences between commercial and household farmers. More of commercial farmers scored high when compared to household dairy farmers. The sources utilized by the respondents most of times were other and progressive farmers followed by Veterinary hospital, Neighbours / Friends, Training, etc. Respondents were seeking most of the information on Selection criteria for disease free animal followed by Storage of feed, Supplemental feed preparation and Health care. More than half the numbers of observed dairy sheds were located in areas with a foul smell. A significantly large majority of farmers were allowing animals in the shed after/before milking. A majority of veterinary professionals were having moderate to strongly favourable attitude towards animal hygiene. Need to focus on continuing veterinary education is emphasized.

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1. Working knowledge of computer applications (MS Office tools such as MS Word, Power point, Excel and Web browsing tools including Internet) along with a fairly good typing speed (about 25-30 words per minute) to work of any kind on computer by myself.
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