DYNAMIC OF DAIRY INNOVATION PLATFORM IN HARYANA

THESIS SUBMITTED TO THE

ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

(DEEMED UNIVERSITY)

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE

IN

AGRICULTURAL EXTENSION EDUCATION

BY

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B.Sc. (Agri.)

DIVISION OF DAIRY EXTENSION

ICAR-NATIONAL DAIRY RESEARCH INSTITUTE

(DEEMED UNIVERSITY)

KARNAL-132001 (HARYANA), INDIA

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This is to certify that the thesis entitled, **"DYNAMIC OF DAIRY INNOVATION PLATFORM IN HARYANA"** submitted by **Mr. ABHISHEK JADHAV** in partial fulfillment of the award of the degree of **MASTER OF SCIENCE IN AGRICULTURAL EXTENSION EDUCATION** of the **ICAR-National Dairy Research Institute, Karnal (Haryana), India,** is a *bonafide* research work carried out by him under my supervision and no part of the thesis has been submitted for any other degree or diploma.

Dated: 13/07/2018

(B. S. Meena)
MAJOR ADVISOR

Dedicated to my beloved grandparents, family and farmers of the Nation

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Place: Karnal

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ABBREVIATIONS

%	:	Per cent
N	:	Number of respondents
Ft.	:	Feet
Sq. km.	:	Square kilometer
^{0}C	:	Celsius
Ha	:	Hectare
kg	:	Kilogram
l	:	Litre
No.	:	Number
Rs.	:	Rupees
SMS	:	Subject Matter specialist
PPM	:	Pasu Palan Mela
KVK	:	Krishi Vigyan Kendra
NGO	:	Non Governmental Organisation
VO	:	Veterinary Officer
VLDA	:	Veterinary Livestock Development Assistants
Paravet	:	Paraveterinary
VLI	:	Veterinary Livestock Inspector
DMRT	:	Duncan's Multiple Range Test
Ca	:	Calcium
HS	:	Hemorrhagic septicemia
FMD	:	Foot-and-mouth disease
S.E.	:	Standard Error

ABSTRACT

An innovation platform brings together dairy stakeholders to share the information for the benefit of farmers. Access to information is a constraint for many actors in agriculture in general and dairy sector in particular. Moreover uncertainty exists regarding the quality and reliability of the available information. Hence, a study "*Dynamic of Dairy Innovation Platform in Haryana"* was conducted with emphasis on dissemination of dairy information through innovation platforms and its influence on the performance of the farmers especially in the biophysical change in dairy farming practices. There are two regions of Haryana i.e. Eastern region and Western region, and from each region one district was selected based on highest bovine population. Thus from selected two districts total 140respondents comprising of 80 farmers and 60 actors were personally interviewed. The result of the study shows that most of the farmers (50.00%), extension personnel (55.00%) and input suppliers (65.00%) belonged to middle age group (36 to 50 years) while researchers (50.00%) in old age group (>50 years). The actors of dairy innovation platform particularly Researchers were having more experiences as compare to Extension personnel and Input suppliers. The net annual income of almost half of the farmers was ranging from Rs. 2.3 lakh to 3.5 lakh. Average herd size was 6.23, out of which 36.00 per cent was occupied by crossbred cattle and average milk production was 46.06 lit/day/household in the study area. The study revealed that the actors disseminated maximum dairy information on animal breeding practices (76.22%) and dairy information shared was maximum from extension personnel especially on animal health practices (27.58%) and dairy management practices (26.25%). The farmers were utilizing progressive farmers up to the extent of 76.67 per cent with 75.58 per cent credibility. It was observed that the actors were significantly highly credible on input suppliers ($77.61^{c}\pm1.45$). It was also observed that the credibility of actors on "Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information" was same from both extension personnel (91.00%) and input suppliers (91.00%). There was incremental change in the technology of scientific dairy farming practices over a period of five years from 2012-13 to 2017-18. Hence, better focus can be incurred for farmers by extension personnel (KVK, NGO, VO, etc.) and input suppliers (Drug vendors, equipment suppliers etc.) on improvement of dairy farming practices like animal breeding, animal feeding, animal healthcare and dairy management practices.

हरियाणा में डेरी इनोवेशन प्लेटफार्म की गतिशीलता

सारांश

डेरी इनोवेशन प्लेटफार्म किसानों के लिए गुणात्मक एवं समय पर सुचना उपलब्ध कराता है। यह देखने में आया है कि किसान अक्सर बहुत सारे सुचना स्रोत से जानकारी हासिल करता है जिसकी विश्वसनीयता के बारे में कुछ नहीं कहा जा सकता। इन सभी बातों को ध्यान में रखते हुए डेरी इनोवेशन प्लेटफार्म के ऊपर हरियाणा में एक अध्ययन किया गया। साथ ही यह भी पता लगाया गया कि किसान कौन–कौन से सूचना स्रोतों से जानकारी हासिल करते है और उनकी गुणवत्ता कितनी है। हरियाणा के 2 जिलो से 80 किसान, 20 शोधकर्ता, 20 डेरी एवं पशु प्रसार कार्यकर्ता और 20 संबधित क्षेत्र के व्यवसायी का व्यक्तिगततौर पर साक्षात्कार किया गया। शोध के परिणाम अनुसार सभी उत्तरदाता मध्यम आयु वर्ग (36–50वर्ष) के थे। लेकिन आधे से अधिक शोधकर्ताओं की आयु 50 वर्ष से अधिक थी। इसलिए शोधकर्ता अपने–अपने कार्य क्षेत्र में अधिक तर्जुबेकार थे। किसानों की औसतन वार्षिक आय 2.50–3 लाख रू. थी एवं प्रत्येक किसान के पास 6 पशु थे और इनमें से लगभग 36 प्रतिशत संकर नस्ल की गाय देखने को मिली। एक दिन का औसत दूध उत्पादन 46 लीटर प्रतिदिन प्रति किसान पाया गया। डेरी इनोवेशन प्लेटफार्म के द्वारा 76 प्रतिशत तक पशु की नस्ल एवं प्रजनन संबधी समस्याओं का निवारण किया गया। यह भी देखने को पाया कि उन्नतशील डेरी पशुपालक से भी किसान डेरी फार्मिंग के बारे में जानकारी हासिल करते है। किसान डेरी मेला एवं पशु मेले के माध्यम से 91 प्रतिशत तक सूचनाओं का उपयोग करते है। डेरी इनोवेशन प्लेटफार्म के प्रभाव से डेरी तकनीकि में सकारात्मक परिवर्तन देखने को मिला। पशु आहार एवं दवा विर्केता, कृषि विज्ञान के अधिकारी, पशुचिकित्सक का समुचित उपयोग करने से किसान वैज्ञानिक विधि से पशुपालन कर रहें है। अत डेरी इनोवेशन प्लेटफार्म किसानों के लिए गुणात्मक एवं समय पर सुचना उपलब्ध करा रहा है जिसके फलस्वरूप पशुपालक खुशहाल है।

शोधार्थी **मुख्य मार्गदर्शक**

CHAPTER –1

Introduction

1. INTRODUCTION

India ranks first among the world's milk producing nations since 1998 and has the largest bovine population in the world. Livestock production and agriculture are intrinsically linked, each being dependent on the other, and both crucial for overall food security. Several measures have been initiated by the government to increase the productivity of livestock, which has resulted in increasing the milk production significantly from 17 million tonnes in 1950-51 to 165.40 million tonnes in 2016-17. FAO reported the world milk production to 803 million tonnes in 2015. The per capita availability of milk in the country which was 130 gram per day during 1950-51 has increased to 355 gram per day in 2016-17 which is more than the world average of 299 grams per day in 2015. This represents a sustained growth in the availability of milk and milk products for growing population. (DAHD&F report 2016-17, GOI).

Haryana is now a leading contributor to the country's production of food grains and milk. Agriculture is the principal occupation of the residents of the state. The flat arable land is irrigated with ground water extracted with submersible pumps and tube wells, and by surface water through extensive canal system. Haryana's contribution to the Green Revolution made India self-sufficient in food production in the 1960s and onwards.

Animal Husbandry has transformed itself into an industry in Haryana. The State with 1.3 percent geographical area ranks second in the country in terms of 877 grams per capita per day milk availability in 2015-16. (DAHD&F report 2016-17, GOI).

An Innovation Platform is the framework that makes stakeholders along the value chain together for continuous interaction lessons learning through action research to ensure that technology generation, dissemination and adoption takes place on targeted commodities or systems for the economic benefit of stakeholders. This kind of platform can be enhanced by the use of information and communication technology including internet.

Examples of innovation platforms in agricultural research and development (CGIAR, 2013):

- In a Fodder Adoption Project, the International Livestock Research Institute (fodder adoption.wordpress.com/tag/fap) used innovation platforms in Ethiopia to improve livestock feeding.
- The Forum for Agricultural Research in Africa (www.fara- africa.org) promotes the use of innovation platforms in integrated agricultural research for development programmes that target productivity, markets, natural resource management and policy issues.
- The National Dairy Research Institute in Haryana promotes the use of innovation platforms by integrating all the actors through Farmer Farm School (FSS) and Dairy Mela every year. Also KVK's & ATIC provide innovation platform interaction for different actors every 11^{th} month.

Innovation platform: An innovation platform as an equitable, dynamic space that brings together heterogeneous actors together to exchange knowledge and take action to solve a common problem (Cadilhon, 2013).

An innovation platform is defined as 'a space for learning and change'. It is a group of individuals (who often represent organizations) with different backgrounds and interests: farmers, traders, food processors, researchers, and government official's etc. The members come together to diagnose problems, identify opportunities and find ways to achieve their goals. They may design and implement activities as a platform, or coordinate activities by individual members (CGIAR, 2013)

Innovation platforms on which stakeholders will interact to jointly identify problems, device solutions, implement research and development agenda and evaluate the cycle (A.A. Adekunle and A.O. Fatunbi, 2012).

Innovation network: A diverse group of actors that voluntarily contribute knowledge and other resources (such as money, equipment, and land) to jointly develop or improve a social or economic process or product. These networks are also known as innovation platforms.

Farmer organization: An organization integrated only by farmers seeking solutions to production or commercial problems.

Organization: A group of actors that collaborate over a sustained period. An organization can be either formal or informal. Collaboration may take different forms, including frequent exchanges of information, joint priority setting for policies and programs, and joint implementation of innovation projects.

Information sharing: Information sharing is the practice of exchanging data and knowledge between people or institutions.

The interaction of the actors linked through the Innovation Platform takes place either physically or virtually. The Innovation Platform is a physical, virtual or physico-virtual network of stakeholders which has been set up around a commodity or system of common interest to foster association, partnership and shared focus to generate innovation on the commodity or system. A typical Innovation Platform should have a mix of stakeholders drawn from both the public and private sector stakeholders such as scientists, extension workers, representatives of farmers, farmers' associations, private firms, non-governmental organizations and government policy makers who communicate, cooperate and interact (often across sectorial and ministerial lines). Innovation Platforms (or networks and forums) assemble stakeholders to share information, identify opportunities, discuss problems, and agree on joint activities related to a shared interest, often with a specific commodity/cluster focus. They usually provide a means for many participants to exchange opinions but tend to imply less commitment to addressing the needs identified, compared to co-design approaches, consortiums, or competitive grant schemes. Innovation platforms focus on all kinds of innovation, not necessarily research alone, and they may be led by actors other than researchers. Even so, they present an important venue and opportunity for many research organizations to engage with other Agricultural Innovation System actors, improve their understanding of how they can best fit into the Agricultural Innovation System, and develops partnerships. In transforming countries, innovation platforms are likely to be more mature than in agriculture-based countries, where public support and funding are pre-requisites for success (Source: Agricultural Innovation Systems: An investment source-book, World Bank, 2012).

Innovation platforms bringing together dairy stakeholders harbour the potential to improve accountability and quality of information, to benefit farmers and consumers.

An innovation platform is a space for learning and change. It is a group of individuals (who often represent organizations) with different backgrounds and interests:

farmers, traders, food processors, researchers, government officials, etc. The members come together to diagnose problems, identify opportunities and find way to achieve their goals. They may design and implement activities as a platform, or coordinate activities by individual members (CGIAR, 2013). Access to information is a constraint for many actors in the dairy subsector, and uncertainty exists regarding the quality and reliability of the information that is available. Actors in the dairy value chain such as farmers and traders lack awareness of where and how to access information. Further, in instances that they are aware of information sources, they are faced with the inability to access those sources principally because extension workers and research institutions have limited resources or opportunities for passing on information. The private sector, especially those involved in supplying feeds and drugs have continuously given inconsistent information on their products to farmers and input traders. However, farmers have no capacity to judge the accuracy of this information in addition to having minimal regulation of the quality of this information often enforced through advertising standards. An innovation platform brings together dairy stakeholders, harbour the potential to improve accountability and quality of information, to benefit farmers and consumers. This study therefore, intends to assess how much the structure of innovation platforms disseminate information to farmers and shares information between the actors, influences utilization of information sources with their credibility and its influence on the performance of the dairy farmers especially in assessing the biophysical change in scientific dairy farming due to Innovation platform with study entitled as ***"Dynamic of Dairy Innovation Platform in Haryana"*** with the following objectives:

1.1 OBJECTIVE OF STUDY

1. To study the dynamic of actors involved in scientific dairy farming in the study area
2. To find out the utilization of dairy innovation platform by the respondents
3. To assess the biophysical change in scientific dairy farming due to Innovation Platform

1.2 RESEARCH QUESTIONS

In this context, the following research questions, which require empirical probe, are the following:

1. How does dynamic of actors involved in scientific dairying show interactions between key actors; their habits, practices & incentives influencing the nature & extent of interactive relationships?
2. How does the utilization of dairy innovation platforms influence the identification of information sources, utilization services and its credibility on actors?
3. How do dynamics of Innovation platform affect biophysical change of scientific dairy farming?

1.3 LIMITATIONS OF THE STUDY

Although to make this study more comprehensive as much as possible all efforts has been made. But it is not possible to cover all aspects investigation in single research proposal. The following limitations are given below:

1. The collection of data is done through personal interview based on the expressed responses and perception of the respondents, their ability to recall and on the opinion expressed by them. So there was complete freedom from individual bias and prejudices cannot be claimed.
2. Scarcity of time and money are one of the limiting factor in the study to use the larger sample for qualitative and quantitative assessment.
3. Although very carefully all the variables are taken for the study, still some missing variables cannot be ruled out.
4. The study was done mainly in rural and peri-urban areas, though the farmers were also there in the urban areas.

Even though, there were limitations, still all efforts had been made to make this study more useful and as deep and systematic as much as possible.

1.4 ORGANIZATION OF THESIS

This dissertation has been organized in seven chapters in logical sequence to facilitate its handling and report writing, the first chapter on introduction contains the relevant background information and scope of the study along with its significance and limitations.

In the second chapter reviews of literature, past studies conducted by researchers have been presented. The third chapter i.e. Research methodology covers locale of the study, sampling plan, operationalization and measurement of selected variables, data collection and statistical tools applied to analyze the data.

The findings derived under the present study have been presented in fourth chapter results and discussion and the last chapter deal with the summary and conclusions. Bibliography and appendices on information utilized in this study have also been presented at the end.

CHAPTER –2

Review of Literature

2. REVIEW OF LITERATURE

It is an essential preliminary task to be undertaken in a research study. It helps the researcher to acquaint with the available body of knowledge in the area of interest. Reviewing of literature bring clarity and focus to the concerned research problem which further helps to improve the methodology and also broaden the knowledge base within the area of planned research. Based on the objectives, the review of literature has been presented under the following subheads:

2.1 DYNAMIC OF ACTORS INVOLVED IN SCIENTIFIC DAIRY FARMING IN THE STUDY AREA

Social organization, representation, and incentives are important to make sure a 'true' participatory and inclusive innovation process. It requires flexible planning that stimulates incremental change through a mix of technological, organizational, and institutional innovations and (reflexive) learning. Than a better understanding of local institutions embedded in norms and values is crucial to change people's practices and decisions. As there is often weak linkages among actors in the innovation system, brokers have a vital role to play to facilitate these inclusive innovation processes. (Kees Swaans *et al.*, 2014). The engagement and successful participation of the various multi-stakeholders creates interest in sustaining the platform partly by the Innovation Platform arrangement and ensures that all partners have a contribution to make and an obvious benefit derive from the activities of the Innovation Platform. (Adekunle and Fatunbi, 2012). The categorization of actors into six domains: (1) Enterprise domain – actors used codified knowledge and generated largely tacit knowledge; (2) Research domain – actors generated codified knowledge; (3) Intermediary domain – actors played an intermediary (knowledge broker) roles; (4) Demand domain – actors that consumed feed and peri-urban dairy products and services; (5) Support domain – actors that supported the integrated intervention innovation system and (6) Policy domain – actors involved in the formulation of policies related to feed and peri-urban dairy value chain development. (Geleti *et al,* 2016). The innovation system approach offers opportunities for bringing different levels of the

systems together to function effectively as a system. The innovation platforms showed that different levels are required to enhance an innovation system: the farmer level self organization and capacity to innovate and manage collective action; the service providers focus and the platforms which bring these actors together to perform on agreed issues can be viewed by integration domain around a common compelling goal and establishing mutual accountability for success and failure among actors. Managing participation of actors was an important aspect. It is not about involving every-body at the same time; it is about involving the right or relevant people, at the right time for the right work and to create a benefit by making the whole system work. Knowledge Management was integrated in the process of social learning and innovation and innovation systems is context specific, with different innovation challenges, involving different actors at different level, there was no blueprint or single strategy on how to do it. (Ngwenya and Hagmann, 2011). Innovation Platform comprises of different intermediary actors to build bridges between the different components in innovation systems, that makes the platform effective with different innovation intermediaries enabling them to be complementary and helps in monitoring adaptive management of innovation through innovation platforms. (Kilelu *et al.*, 2013). There are many and diverse actors in the dairy systems with the public actors playing the dominant role and autonomous private services' scope and role being constrained by lack of knowledge, resources, and adequate public support. Public actors had weak knowledge linkages with NGOs and policymakers and their response capacity was limited by role ambiguity, rigid mandate, and ineffective incentives and accountability systems. Available evidence indicated that habits, practices and competencies of the public actors were not sufficiently reconfigured in response to changing context. (Tefera *et al.,* 2008). The Milk market innovation system analysis understands the lacunae of information flow in the system, as well as to understand the linkage pattern among the actors of innovation system. The dairy farmers of the coastal saline soil zone got good information support from private milk collection agent and veterinary doctor. The role of the extension agents is more proactive in disseminating important information related to dairy farming, as well as milk marketing. The major constraints of milk marketing, as perceived by the dairy farmers in the zone, is the lack of regulated markets and cooperatives, lack of market facilities, unawareness of clean milk production and lack of finance. (Mohammad *et al.*, 2012).

2.2 UTILIZATION OF DAIRY INNOVATION PLATFORM BY THE RESPONDENTS

The actors first use their own skill (their knowledge base) to assess a fresh innovation. If own experience was insufficient, they resorted to the next finest thing, local search channels. Local channels provided them required information relatively easily. Non-local communication channels involved the highest search costs to get the needed information. Use of all three channels grows as the knowledge base increases in size. Actors with a small knowledge base have insufficient knowledge to evaluate new innovations on the basis of their own skill. Therefore, they turn to local search channels. At a certain critical point the actors' knowledge base has grown so large that the local information channels do not provide enough useful new information anymore. The use of local channels declined, but the importance of non-local channels and owns experience continues to grow. (Rijnsoever and Castaldi, 2008). The personal localite sources like neighbours, friends, progressive farmers and opinion leaders played an important role in transfer of rapeseed-mustard technologies to the fellow farmers. These sources with high credibility were widely used by majority of the respondents. The most revealing finding of the study is that VLWs or Agriculture supervisors had lost their credibility among the farmers while the input dealers and agents of commercial seed, fertilizers, plant protection, etc., played a critical role in information network of rapeseed- mustard farmers, however their credibility was low. It was important to note that scientists and agriculture officers were perceived a much credible source of information by rapeseed-mustard farmers; nevertheless these sources were less accessible to the farmers. Further, the increasing literacy rate and easy accessibility of the mass media channels resulted in increased utilization of these media by the farmers. (Sharma *et al.,* 2008).

The lack of information support from the institutional sources resulted in the development of personal information sources to exchange information and diffuse technology among the farmers themselves. (Demiryurek *et al.,* 2008). The nursery, dairy, and berry managers most often used information from print media (63% to 84%), followed by other farmers (50% to 80%). Fresh market vegetable growers used conferences (60%) most often, followed by print media (41%). The information source rated most useful was "other farmers" for the nursery, dairy and fresh market vegetable managers. Nursery and fresh market vegetable managers rated conferences as second most useful, whereas dairy managers rated print media second. Berry managers were not

asked about usefulness. Farm manager information behavior exhibits some common features but is also specific to their operation type. Research and outreach efforts intending to communicate information to farm managers may be able to be more efficient at reaching and persuading their intended audience if they first investigate manager information behavior. (Chapman *et al.*, 2009). Among all four categories of information sources viz. mass media, institutional, non-institutional and extension activities overall mean score of preference for TV, Dairy Co- operatives, family members and pashu palan mela were higher by dairy farmers. A significant difference was found among small, medium and large dairy farmers in relation to their preference for internet, veterinary university, KVK and training programme as animal husbandry information sources. (Chauhan and Kansal, 2016).

2.3 BIOPHYSICAL CHANGE IN SCIENTIFIC DAIRY FARMING DUE TO INNOVATION PLATFORM

The milk production found to be suboptimal, with only few lactating animals in each herd and average milk yields of 9 litres per day. Cattle diseases are an important threat to farmers, but they lack knowledge and capacity on disease prevention and control. Farming and milk harvesting practices are in general acceptable, but farmers have very poor knowledge on zoonoses and on practices that can mitigate milk contamination. (Alonso, 2014). The nutritionally balancing the ration of animals under field conditions using locally available feed resources and mineral mixtures, it was possible to increase daily milk yield and/or milk fat level as well as the profitability of the farms. It was also possible to reduce the cost of feeding per kg of milk production in many cases. In addition, balanced feeding also helped in reducing CH_4 emissions per kg of milk, improve immunity and reduce incidences of parasitism. (Garga *et al.*, 2013). The scale of the yield gaps for dairy production in areas of Ethiopia and India indicates that there are opportunities to increase production within the constraints of current production systems. It also appeared possible to increase production past currently attainable yields. Household modelling showed that milk yields, reproduction, growth rates and survival can be improved through better nutrition and genetics, but the biggest increases will be realised when multiple strategies are combined (Mayberry *et al.*, 2017). The dairy resources such as land, feed, genetic resources and services in the current system were compared to the previous regime in relation to how dairy innovation affected. It showed reduction in milk productivity by smallholder farmers in the Addis Ababa milk shed. The

policy of the government, based on a free market economy, privatization and investment, was contributing to diversification and innovation, but mainly in the processing industry and commercial farmers. Productive interactions of dairy actors were also identified. These interactions were growing over time and found that four factors contributed to the existing market problems, namely the extended fasting season (196 days per annum) of the Orthodox Church believers; a limited tradition of milk drinking in Addis Ababa, high milk prices when compared to low incomes of the majority of citizens, and underutilization of the capacity of the milk processing industry, mainly as a result of a limited domestic market and the dominance of the informal milk market. (Ezezew, 2014). The overall Average daily milk yield (ADMY) and Lactation length (LL) was estimated to be 5.75±0.65 litre/day/animal and 276±14 days/ animal. The average peak yield of buffalo in the field condition was estimated to be 8.56±0.85 litre /animals while Age at first calving (AFC) was 1288±122 days/ animals respectively. It showed that, 41.00 percent of respondents were having high level of knowledge about productive and reproductive practices. While about 30.00 percent of respondents were having medium levels of knowledge. Knowledge index on productive and reproductive parameters of dairy animal was calculated and observed, those respondents were possessing 73.47 and 70.21 percent knowledge (Meena *et al.*, 2016). The Overall morbidity and mortality rates in cattle were 22.24% & 4.42%, respectively in Pune, Maharashtra. Reproductive (7.09%) and digestive (5.14%) diseases were major causes of morbidity. Digestive (1.43%) and nutritional (0.85%) diseases were major causes of mortality of cattle. Highest mortality rates (16.81%) were observed among calves and male were at higher (17.86%) mortality risk than that of female. Adult cattle showed high (28.97%) morbidity due to reproductive problems which are major challenges under village conditions. This determined the health status of cattle & provided the guidelines for proper use of managemental practices that helps in increasing production and improvement of economic status of livestock owners (Bangar *et al.*, 2013).

CHAPTER –3

Research Methodology

3. RESEARCH METHODOLOGY

Research methodology is considered to be a “blue-print” of the research architect that provide framework for the research exertion that helps in describing the various techniques and procedures used to accomplish the research programme. It helps the researcher to keep his work going in the right and appropriate direction. It further helps in the interpretation of the findings. It has been organized under the following sections:

3.1 Locale of the study

3.2 Research design and sampling plan

3.3 Variables and their measurements

3.4 Operationalization of variables

3.5 Tools and techniques used for data collection

3.1 LOCALE OF THE STUDY

The present study was undertaken in the state of Haryana during the year 2017-18. The said state was purposively selected because of following reasons.

1. Haryana is traditionally an agrarian society of zamindars (owner-cultivator farmers) and the Green Revolution in Haryana of 1960s resulted in the significantly increased food grain production.
2. It is well known for high-yield Murrah buffalo and other native breeds of cattle viz., Haryanvi, Mewati, Sahiwal and Nili-Ravi.
3. To support its agrarian economy, both central government (Central Institute for Research on Buffaloes, Central Sheep Breeding Farm, National Research Centre on Equines, Central Institute of Fisheries, National Dairy Research Institute, Indian Institute of Wheat and Barley Research and National Bureau of Animal Genetic Resources) and state government (CCS HAU, LUVAS, Government Livestock Farm, Regional Fodder Station and Northern Region Farm Machinery Training and Testing Institute) have opened several institutes for research and education.

Due to all these reasons, there was increase in the usage of Innovation Platform by different actors (Researchers, Extension personnel and Input suppliers) and farmers involvement for improvement in the dairy farming practices in the Dairy Innovation Platform.

3.1.1 Description of the study area- Haryana

Haryana is a landlocked state in northern India. The name Haryana is found in the works of the 12th-century AD Apabhramsha writer Vibudh Shridhar. The name Haryana has been derived from the Sanskrit words Hari (the Hindu god Vishnu) and ayana (home), meaning "the Abode of God". Haryana as 17th state was constituted in 1966. The State Capital is located at Chandigarh. It is between 27°39' to 30°35' N latitude and between 74°28' and 77°36' E longitude. The total geographical area of the state is 4.42 m ha, which is 1.4 percent of the geographical area of the country. The altitude of Haryana varies between 700 and 3600 ft (200 metres to 1200 metres) above sea level. Haryana has only 4 percent (compared to national 21.85%) area under forests. Haryana is the nation's seventeenth most populous state and the population of Haryana is 25,353,081, according to the 2011 census. According to the 2011 census, of total 25,350,000 population of Haryana, Hindus (87.46%) constitute the majority of the state's population with Sikhs (4.91%), Muslims (7.03%) (mainly Meos) being the largest minorities. The population density is 573.4 people/km^2. Haryana has a skewed sex ratio at 861.

Haryana is one of the newly created states carved out of the greater Punjab province. It is bordered by Punjab and Himachal Pradesh in the north and by Rajasthan in the West and South. The perennial river Yamuna defines its eastern border with Uttrakhand and Uttar Pradesh. Haryana surrounds Delhi on three sides. Consequently, a large area of Haryana to her advantage is included in the National Capital Region. Haryana is extremely hot in summer at around 45°C (113 °F) and mild in winter. The hottest months are May and June and the coldest December and January. The climate is arid to semi-arid with average rainfall of 354.5 mm. Around 29 percent of rainfall is received during the months from July to September, and the remaining rainfall is received during the period from December to February.

Since the creation, Haryana has emerged as a forefront progressive state in India and set a glaring example of planned economic development. Ranked first in per capita income, Haryana has combined growth with equity in minimum gap between rural and urban

prosperity. Besides this, Haryana is: (Integrated Sample Survey Report, AHDP, Govt. of Haryana, 2015-16)

- Amongst the top industrialized State, ranks third in per capita Value Addition.
- Sixth in the roster of Industrial Entrepreneurship Memoranda (IEMs).
- No.1 in country in implementation of Industrial Entrepreneurship Memoranda (IEMs).
- Ranks fourth as per the infrastructure index developed by CMIE.
- One of the top agrarian states contributes substantially to the national food grain pool of wheat, rice, coarse cereals and pulses.
- Rank second in the country in per capita per day availability of milk (877g) in 2015-16 in the country (DAH&DF report 2016-17, GOI)

Haryana is one of the leading state in the country in terms of per capita income and proudly identifies itself as:-

1. First in the country to achieve 100 percent electrification.
2. First in the country to link all villages with all weather roads.
3. First in the country to provide safe drinking water facilities throughout the State.

3.1.1.1 Animal Husbandry and Dairying sector in the state

The animal husbandry sector plays an important and vital role in providing a source of food, rich in animal protein to the general public and supplementary income to the economically weaker section of the society and small farmers, marginal farmers and agricultural labourers. In addition, it offers a good employment generation potential, if adopted on large commercial basis. Despite mechanization in various agricultural operations, draught animal plays a very significant role. Bullock power is main source of draught power in agricultural operation and transport of agricultural products to the nearby markets in some cases. A large number of rural women folk find good opportunities to work in several operation of livestock production. Moreover, the agricultural production programme gets valuable organic manure provided by the livestock. It is also useful for bio-gas production, which is a good source of non conventional energy use for domestic cooking and lighting. Contribution of livestock

products towards the State income is really remarkable because the value of livestock products has been consistently increasing year after year. The output value of livestock products is considerably higher.

As per the results of the livestock census 2007 in Haryana State there were 89.98 lakhs livestock population, showing a decrease of around 0.57 percent over 2007 census. The cattle have increased by 16.49% and buffaloes have increased by 2.22% in 2012 over 2007.

3.1.2 Brief description of the selected districts

3.1.2.1 Brief description of Karnal

Karnal is known as the land of Daanvir Karan. The Karnal city was formed as District on 1 November 1966, when Haryana was carved out of Punjab. Karnal is having 8, 85,000 cover of human population spread over an area of 1967 sq km. Karnal is famous for shoes, agriculture research institutions and Basmati Rice. It is 123 km from Delhi on the National Highway NH1, (called the GT Road), and 126 km from Chandigarh. Karnal is surrounded by Kurukshetra district on its northwest, Jind, Kaithal districts on its west, Panipat district on its south and Uttar Pradesh on east. Karnal is having four ICAR research institutes namely NBAGR (national bureau of animal genetic resources), CSSRI (central soil salinity research institute), IIWBR (Indian institute of wheat and barley research), and National Dairy Research Institute (NDRI). Two regional sub stations of SBI (Sugarcane breeding institute) and IARI (Indian agriculture research institute). It also has one Krishi Vigyan Kendras of NDRI Karnal and one Krishi Gyan Kendra of CCSHAU Uchani.

3.1.2.1 Brief description of Hisar

Hisar is located at 29^0 05' N 75^0 26′E29.09^0 N 75.43^0 E in western Haryana. It has an average elevation of 215 metres (705 ft) above mean sea level. Hisar is known as the steel city because of the Jindal Stainless Steel Factories. It is also the largest producer of galvanized iron in India.

It is located 164 kilometres to the west of New Delhi and has been identified as a counter-magnet city for the National Capital Region to develop as an alternative centre of

growth to Delhi. Hisar is having a population of 1,742,815 roughly equal to the nation of The Gambia or the US state of Nebraska. It is the second most popular district of Haryana after Faridabad. Its population growth rate over the decade 2001-2011 was 13.38 per cent. Hisar has a sex ratio of 871 females for every 1000 males and literacy rate of 73.20 per cent. Haryanvi is the most spoken dialect in the district. Hisar has two universities namely CCSHAU (Chaudhary Charan Singh Haryana Agricultural University) and LUVAS (Lala Lajpat Rai University of Veterinary and Animal Sciences). Hisar has a continental climate, with very hot (40-44 ^{0}C) summers and relatively cool (4-6 ^{0}C) winters. The main characteristics of climate in Hisar are dryness, extremes of temperature and scanty rainfall (354 mm). The city witnesses very hot summers and cool winters.

Table-3.1: Demographic parameters of the study area

Sl. No.	Particulars	Karnal	Hisar	Haryana
1	Area (In Sq.km)	2520	3983	44212
2	Population	1505324	1743931	25351462
3	Density	597	438	573
4	Literacy percentage (%)	74.73	72.89	75.55
5	Sex ratio	887	872	879
6	Number of Household	290,964	335608	4,835,765
7	Total Workers (Main & marginal)	516062	691,621	8916508
8	Main Workers	411533	531,227	7015283
9	Marginal Workers	104529	160,394	1901225
10	Non-Workers	989262	1,052,310	16434954
11	Cultivators	112288	261,120	2480801
12	Agricultural Labourers	133723	144,213	1528133

Table-3.2: Dairy animals profile of the study area

Particulars		Haryana	Karnal	Hisar
Indigenous cattle	Male	311249	4077	66667
	Female	500764	20994	50611
	Total	812013	25071	117278
Crossbred cattle	Male	159879	17829	8470
	Female	836224	107078	35925
	Total	996103	124907	44395
Total cattle		1808116	149978	149978
Buffalo	Male	937883	65961	72845
	Female	5147429	291657	436697
	Total	6085312	357618	509545
Bovines	Male	1409011	87867	147982
	Female	6484417	419729	523233
	Total	7893428	507596	671215

Table-3.3: Profile of the study area

Block	Villages	TGA* (in ha)	TH**	Population			NAH*** (in ha)	NSA**** (in ha)
				Male	Female	Total		
Hisar-1	Harita	537	453	1181	1120	2301	47	490
	Mirka	663	469	1258	1149	2407	67	549
Barwala	Barwala (Rural)	8003	1789	5106	4488	9594	454	7549
	Dhadh	930	560	1635	1366	3001	62	859
Karnal	Subhri	277	360	812	755	1567	29	228
	Singoha	1207	1481	4109	3685	7794	145	1062
Indri	Kamalpur roran	482	340	1013	899	1912	76	393
	Gorgarh	216	350	952	867	1792	41	175

(TGA*= Total geographical area; TH**=Total Household; NAH***=Area under non-agricultural uses; NSA****=Net sown area)

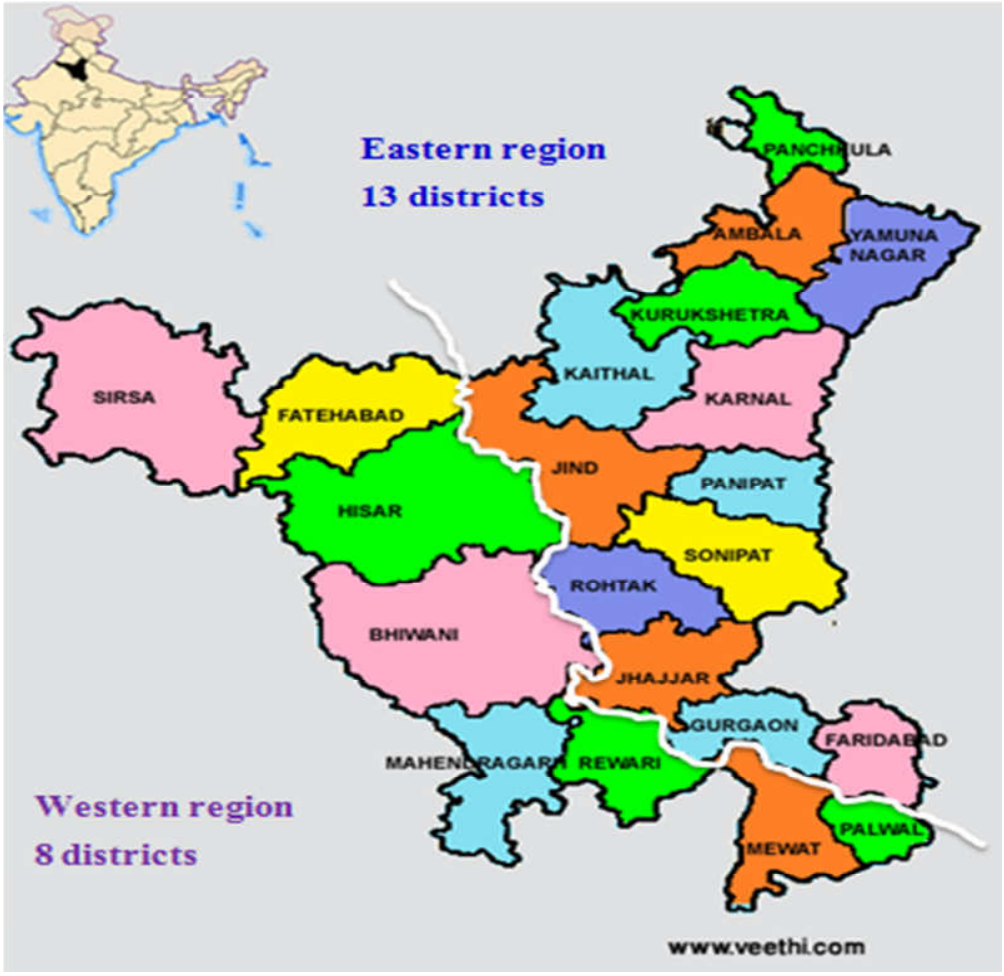

Fig-3.1: Map of study area

3.2 RESEARCH DESIGN OF THE STUDY AND SAMPLING PLAN

The ex-post-facto research design was adopted for this study since the phenomenon has already occurred. Ex-post facto research is a systematic empirical inquiry in which the scientist does not have direct control on independent variables because their manifestations have already occurred (Kerlinger, 1983).

3.2.1 Sampling plan

Sampling plan is a blueprint for how a sampling event or program will be executed. It should provide all the details needed to ensure the representative samples collected.

3.2.1.1 Selection of districts

The Haryana state is divided under different regions which comprises of 22 districts divided into two agro regions viz. Eastern region and Western region. Both the two regions will be purposively selected for the study to represent the entire state. Purposively one district in each region i.e. Eastern region and Western region was selected. Thus a total of two districts were selected purposively based upon highest bovine population.

3.2.1.2 Selection of blocks and villages

The study was conducted in 2 districts of Haryana namely Karnal and Hisar from Eastern and Western regions respectively. From each district two blocks were selected randomly, namely from Karnal district, Karnal and Indri blocks and from Hisar district, Hisar-1 and Barwala blocks were selected randomly. From each block two villages were selected randomly i.e. from Karnal block Subhri and Singoha , from Indri block Kamalpur roran and Gorgarh, from Hisar-1 block Harita and Mirka and from Barwala block Barwala (rural) and Dhadh villages were selected. Thus, a total of eight villages were selected for investigation.

3.2.1.3 Selection of respondent

The last stage of sampling process involved was selection of respondents from each village. Before collecting the data in villages, at first the complete list of farmers based on land holding by village competent authority/Gram panchayat was collected. Then, each category farmers were selected by applying random sampling technique in

such a way that total respondents will be 10 from each village and 10 each researchers, extension personnel's and input suppliers were selected from each district. In this way there were 80 farmers and 60 actors of innovation platform were personally interviewed.

3.2.1.3.1 Selection Criteria of the Respondents

- Respondents in researchers, extension personnel and input suppliers were done by Random Sampling technique in each district.
- Respondents from villages were selected based on random sampling according
- Respondents in researchers, extension personnel and input suppliers were having at least 5 years of experience in their respective field.
- Farmers were having milch animals at the time of investigation.

The primary data were collected from the respondents by using PRA tools and personal interview with the help of interview schedule. The collected data will be scored, compiled, tabulated and analysed using appropriate statistical tools to draw rational and meaningful conclusions.

3.3 VARIABLES AND THEIR MEASUREMENTS

For any study in social science research, it is customary to precisely mention the variables used for the study with their working concepts and measurement procedures. After the collection of review of literature and consultation with the experts, relevant variables are selected for the study. The Table-3.4 is showing the selected variables and their operational definition and measurement procedures.

Table-3.4: List of variables and their measurement

Sl. No.	Variables	Measurement
1	Age	Direct questioning
2	Education	Direct questioning
3	Family size	Schedule was developed
4	Family Education Status	Schedule was developed
5	Occupation	Schedule was developed
6	Land holding	Schedule was developed

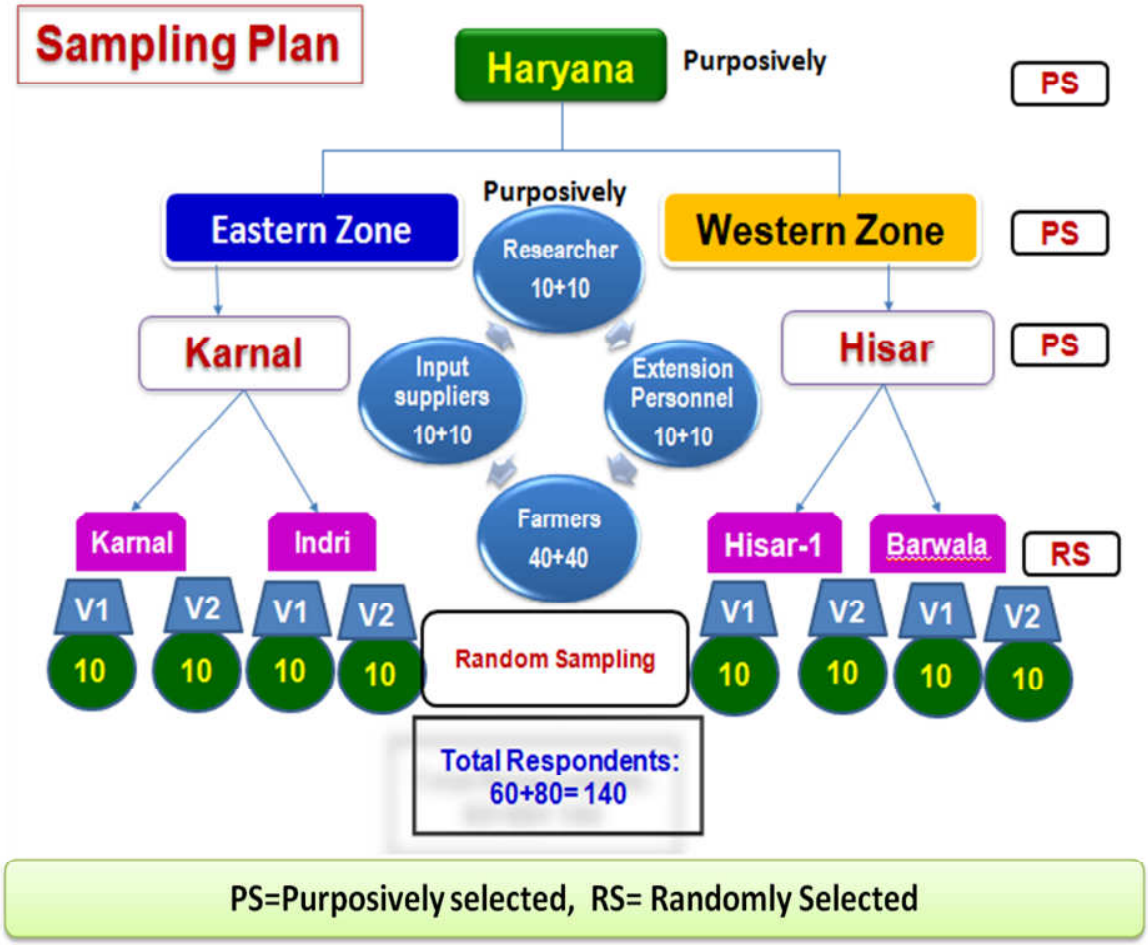

Fig-3.2: Sampling plan

7	Herd size	Schedule was developed
8	Annual Income	Schedule was developed
9	Experience in dairy farming	Direct questioning
10	Milk production and Disposal pattern	Schedule was developed
11	Source of information	Schedule was developed
12	Productive and Reproductive parameters of dairy animals	Schedule was developed
13	Cropping Intensity	Schedule was developed
14	Pattern of interactions between the actors of Innovation platform	Schedule was developed
15	Utilization of services of Innovation platform	Schedule was developed
16	Credibility of actors on Innovation platform	Scale was developed
17	Change in scientific dairy farming	Schedule was developed (memory recall technique)

3.4 OPERATIONALIZATION OF VARIABLES

3.4.1 Age

It was operationalised as number of years completed by the respondents at the time of data collection and it was determined by direct questioning by using interview schedule. The respondents were classified on the following three categories for the actors of dairy innovation platform viz., Farmers, Researchers, Extension Personnel and Input suppliers. (Census report, GOI, 2011).

Category	Years
Young	Up to 35 years
Middle	36 to 50 years
Old	More than 50 years

3.4.2 Education

It was operationalised as the level of formal education accomplished by an individual respondent at the time of investigation. It was measured by direct questioning using interview schedule to the actors of dairy innovation platform viz. Farmers, Researches, Extension personnel and Input suppliers. The respondents were assigned score as:

Category	Score
Illiterate	0
Functionally literate	1
Primary	2
Middle	3
Secondary	4
Senior secondary	5
Graduation and above	6

3.4.3 Family size

It was operationalised as total number of family members that depends on the head of the family. It was determined by using interview schedule developed for the same for farmer. The respondent were classified into three categories as small, medium and large based on the cumulative square root frequency method.

Category	Member (Nos.)
Small	Up to 4 members
Medium	5 to 6 members
Large	More than 6 members

3.4.4 Family Education Status

It was operationalised as number obtained by the family of a respondent. It is the number obtained as divided the total education score secured by the family members of

the individual by the total number of family members of a respondent. It was determined by using interview schedule developed for the same. The respondent were classified in three categories as low, medium and high based on the cumulative square root frequency method.

$$\text{Family Education Status} = \frac{\text{Total educational scores of family}}{\text{Number of eligible members in the family}} \times 100$$

Category	Score
Low	Up to 1.60
Medium	1.61 to 2.49
Large	More than 2.49

3.4.5 Occupation

It was operationalised as the occupations carrying by the respondents for securing livelihood of his/her family. This includes farming and non-farming occupations, at the time of investigation. It was measured by developing interview schedule for farmers.

Category	Score
Crop + Dairy	1
Crop + Dairy + Service	2
Crop + Dairy + Business	3
Dairy+ Labour	4

3.4.6 Land holding

It is operationally defined as the total number of hectares of land owned and leased in by the individual family to operate the farming system by own at the time of investigation. It was determined by a schedule developed for the same to farmers. The respondents were classified into landless, marginal, small, semi-medium and large categories as follows (according to Government of India, 2011).

Category	Land (ha)
Marginal	Up to 1
Small	1 to 2
Semi-medium	2 to 4
Medium	4 to10
Large	More than 10

3.4.7 Herd size

It refers to the total number of indigenous cattle, crossbreed cattle and buffaloes owned by the respondent at the time of investigation. This was determined by a schedule developed for the same to farmers. The respondents were classified into small, medium and large herd size on the basis of cumulative square root frequency method. Moreover average herd size of each animal was calculated.

Category	Animals (No.)
Small	Up to 5
Medium	6-8
Large	More than 8

3.4.8 Annual Income

It was operationally defined as the net annual income savings from various sources in one year by the respondent at the time of enquiry. This was determined by a schedule developed for the same to farmers. Respondents were categorized into low, medium and high income groups based on annual income on the basis of cumulative square root frequency method.

Category	Income (Rs/annum)
Low	Up to 230143
Medium	230144 to 347154
High	More than 347154

3.4.9 Experience in dairy farming

It refers to the actual number of years of experience of the respondent in dairy farming. It was measured by direct questioning and their response was further classified by following cumulative square root frequency (CSRF) method.

Category	Experience (Years)
Low	Up to 13
Medium	14 to 23
High	More than 23

3.4.10 Milk production and disposal pattern

Milk production was operationally defined as total quantity of milk produced in litres by lactating livestock (cow or buffalo), on day prior to data collection. Disposal pattern was operationally defined as the total quantity (litres) of the milk consumed and sold by the respondent.

3.4.10.1 Total Milk Production

Total milk production was operationally defined as total quantity of milk produced in litres by lactating livestock (cow or buffalo), on day prior to data collection. It was determined by developing a schedule for the same, the respondents were classified into low, medium and high milk production on the basis of cumulative square root frequency method.

Category	Litres/day
Low	Up to 37
Medium	38 to 59
High	More than 59

3.4.10.2 Total Milk Consumption

Total milk consumption was operationally defined as total quantity of milk consumed in litres by lactating livestock (cow or buffalo), on day prior to data collection. It was determined by developing a schedule for the same, the respondents were classified into low, medium and high milk production on the basis of cumulative square root frequency method.

Category	Litres/day
Low	Up to 6
Medium	7 to 9
High	More than 9

3.4.10.3 Total Milk Sale

Total milk sale was operationally defined as total quantity of milk sale in litres by lactating livestock (cow or buffalo), on day prior to data collection. It was determined by developing a schedule for the same, the respondents were classified into low, medium and high milk production on the basis of cumulative square root frequency method.

Category	Litres/day
Low	Up to 27
Medium	28 to 50
High	More than 50

3.4.11 Cropping Intensity

It is referred to the proportion of gross cropped area to the net cropped area. The respondents were asked about their crops in Kharif, Rabi and Summer season on their cultivable land. The cropping intensity was calculated by the formula.

$$\text{Cropping Intensity (\%)} = \frac{\text{Gross cropped area}}{\text{Net cropped area}} \times 100$$

Based on the cropping intensity value of the respondents, they were grouped into low, medium and high cropping intensity by cumulative square root of frequency method.

Category	Cropping intensity (%)
Low	Up to 218
Medium	219 to 248
High	More than 248

Plate No.-1: Actors interaction with farmers on scientific dairy farming practices

Plate No.-2: Personal Interview with the respondents

3.4.12 Dynamic of actors involved in scientific dairying

3.4.12.1 Dissemination of dairy information to farmers

The actors knowledge dissemination was analysed on concerned dairy farming practices like Animal Breeding, Animal Feeding, Animal Healthcare, Dairy Management Practices and Advisory services by using semi structured interview schedule. It was measured by calculating the sources of information on dairy innovation platform by the actors to farmers. The data were collected against each item listed in the interview schedule. The numerical scores of 1 for rarely contact, 2 for contact sometimes and 3 for frequently contact were assigned and thus obtained against each item was total up to get overall average weighted score of sources of information by the actors on dairy innovation platform to the farmers.

3.4.12.2 Sharing of information by the actors at dairy innovation platform

The actors sharing of information to each other was analysed on concerned dairy farming practices like Animal Breeding, Animal Feeding, Animal Healthcare and Dairy Management Practices by using semi structured interview schedule. It was measured by calculating the sharing of information on dairy innovation platform by the actors to farmers. The data were collected against each item listed in the interview schedule. The numerical scores of 1 for No contribution, 2 for Less contribution, 3 for Moderate contribution, 4 for High contribution and 5 for Very contribution were assigned and thus obtained against each item was total up to get overall average weighted score of information sharing by the actors on dairy innovation platform to the farmers.

3.4.13 Utilization of information sources and their credibility

It was operationalised as the degree of frequency of contact or exposure of dairy farmers to different sources for obtaining animal breeding, animal feeding, animal health care and dairy management practices information. It was measured by calculating the sources and utilization pattern of dairy innovation platform. The data were collected against each item listed in the interview schedule. The numerical scores of 1 for rarely contact, 2 for contact sometimes and 3 for frequently contact along with that the credibility of those information by respondents through numerical scores of 1 for least credible, 2 for credible and 3 for most credible were assigned and thus obtained against each item was total up to get overall of sources and utilization pattern of dairy innovation platform.

3.3.13.1 Credibility of actors in Dairy Innovation platform

The method of Successive Interval Scaling technique developed by Thurston was used to develop the credibility scale of actors in dairy innovation platform.

Table-3.5: Credibility of actors in Dairy Innovation Platform

Sl. No.	Statements	Q values	Scale values
1	To assess an innovation actor to use their own knowledge and skills.	2.94	3.86
2	Resource person are more credible in providing information required by actors of dairy innovation platform.	2.41	3.53
3	To evaluate dairy actors for having insufficient knowledge and skill.	1.66	2.47
4	Input dealers/agents have more role in dairy innovation platform.	2.10	1.90
5	Scientists and agriculture officers are more credible to the farmers.	1.74	3.68
6	The lack of information support from the institutional sources decreases the credibility.	1.69	1.50
7	Dairy farmers most often use the information from fellow farmers as they are most credible.	2.41	3.44
8	Farmers prefers Dairy Mela/Pasu palan mela(PPM) for source of information	1.96	3.43
9	In animal husbandry practices professionally qualified person is more credible source of information	2.94	3.62
10	Farmers prefers non institutional sources more credible than institutional sources	2.21	1.74
11	Non-local communication channels involves the highest search costs to get the needed information	1.69	1.77
12	The use of local channels is declining over a period	1.57	2.04
13	Effects of sources of motivation for dairy communication have close association with utilization of information	2.32	2.48
14	Easy accessibility of the mass media channels results in increased information utilization by the farmers	2.73	3.41
15	Increasing literacy rate results in increased utilization by the farmers	1.55	2.66
16	Dairy managers most often uses the information from other farmers followed by print media	2.20	2.92

Plate No.-3: Data collection of actors of dairy innovation platform

Plate No.-4: View of compost storage and dairy animals under tree shade

The statements having high scale values and low Q values were selected and were incorporated in the interview schedule of the actors. Average discrepancy was calculated to check the internal consistency of the developed scale. Multiple comparisons were done based on the DMRT (Duncan's Multiple Range Test) at 5% level of significance.

The average weighted percentage was calculated of different actors to understand the credibility of actors in dairy innovation platform as perceived by the actors.

3.3.14 Change in scientific dairy farming

It was operationally defined as to changes in practices like milking operation, management of the herd, housing systems, milking systems, breeding practices, feeding practices, healthcare practices, dairy management practices and productive and reproductive management of the dairy animals in study area. The schedule was developed with memory recall method of over 5 years. Participatory Rural Appraisal (PRA) techniques, secondary data review, semi-structured interview and transact walk were used to ascertain the dairy farming practices in the study area. The sample of dairy farmers with at least one milch animal was drawn from the selected villages by Proportionate stratified random sampling method. The change in dairy farming was studied by contacting to the respondents. The frequency and percentage is used for analyzing data and percent change is calculated by using the following formula.

$$\text{Per cent change (\%)} = \frac{X_2 - X_1}{X_2}$$

Where, X_1 = Frequency of 2012-13

X_2 = Frequency of 2017-18

The interview schedule was developed under following sub-headings.

3.3.14.1 Change in selected technologies: The data on selected parameters of animal breeding, animal feeding, animal health care and dairy management practices were collected through interview schedule with memory recall method of over a period of 5 years.

3.3.14.2 Housing systems: The interview schedule prepared was helped in finding out the change in type of cattle shed and feeding manger of dairy animals over a period of 5 years.

3.3.14.3 Status of calf mortality and animal morbidity: It was operationally determined on the basis of the data from farmers on calf mortality and animal morbidity over a period of 5 years.

3.3.14.4 Productive and Reproductive parameters of dairy animals: It was operationally determined on the basis of the productive and reproductive performance parameters of the dairy animals like age at first calving, service period, dry period, and calving intervals of the dairy animals.

3.5 TOOLS AND TECHNIQUES USED FOR DATA COLLECTION

3.5.1 Instrument used for data collection

Instrument is the device used to collect data. There are two sources of data collection primary and secondary sources. Primary sources provide first-hand information while secondary data are those already recorded for some other purpose but used in research. The instrument used in the study was interview schedule. Based on the understanding of facts and related views, a semi-structured interview was developed to investigate the in-depth various dimensions of the study. Data collection tools was prepared by giving due consideration to various variables, objectives and respondents. The interview schedule was consisting of different parts to cover the objectives of the study.

3.5.2 Statistical tools used for analysis

The data collected from the respondents were tabulated statement wise with respect to each variable of the study. Master sheets containing pooled scores were prepared for respective categories of actors of dairy innovation platform. The collected data was scored, compiled, tabulated and subjected to various appropriate statistical tools to draw meaningful results and logical conclusion. The analytical techniques used in the study include average, frequency, percentage, cumulative square root frequency method, Thurston successive interval scaling technique and DMRT. Data were analyzed for the most part by using the tabular method techniques for analysis which we intensively used for its inherent quality to present the true picture of the dairy innovation platform in simplest form.

CHAPTER –4

Results and Discussion

4. RESULTS AND DISCUSSION

The present investigation was planned to study dynamic of dairy innovation platform in Haryana state. This chapter has been planned in order to bring out the salient outcomes with appropriate discussions, the data collected were analyzed and results are presented and discussed under following sub-headings.

4.1 Profile of the respondents

4.2 Analyzing the knowledge flow among dynamic of actors involved in scientific dairying

4.3 Information Source Utilization and Credibility on concerned dairy farming practices

4.4 Change in scientific dairy farming

4.1 PROFILE OF THE RESPONDENTS

The profile of the respondent in the study area provides a clear picture about their socio-economic attributes which are assumed to influence their dairy farming activities. It further helps in giving appropriate policy implications based on derived conclusion. Accordingly, the categorization and distribution of respondents with respect to the selected variables of the study are given in the following tables and are discussed as below.

4.1.1 Profile of Farmers of dairy innovation platform

4.1.1.1 Age (in years)

The results presented in Table-4.1 indicates that half (50.00%) of the respondents were of middle aged and ranging from 36 to 50 years followed by the category of young (up to 35 years) and old (more than 50 years) which accounts for 27.50 per cent and 22.50 per cent, respectively. It might be due to demographic traits of the study area. This may also be attributed to the reason that the middle aged people involved in dairy practices to earn livelihood for their families and old aged people generally avoid to do hard work due to their work physical strength. Young population were interested in other work because of different livelihoods present in the peripheral areas and some of the young people followed dairy practices because of profitability involved in the dairy especially as a subsidiary component with crop farming and other business/service activities.

4.1.1.2 Education

According to Table-4.1, it was found that about thirty four percent of the respondents were educated up to middle school, where as 21.25 per cent were functionally illiterate, 18.75 per cent were up to secondary school level, 10 per cent were illiterate, 8.75 percent had primary level of education and only 1.25 per cent were educated up to graduate level.

It is due to better communication facilities and availability of educational facilities in the surrounding of the study areas, which made farmers aware about the importance and need of education, made farmers to have good level of education up to senior secondary and graduation.

4.1.1.3 Family size

As a labour intensive activity, family size is important in animal husbandry practices. Therefore, Table-4.1 divulges that majority (63.75%) of the respondents had medium family size (4 to 6 family members) followed by small size (26.25%) and large family size (10.00%) respectively.

It can be inferred that majority of the respondents had medium sized family. It might be due to increasing awareness among the people that the ill-effects of growing population such as high expenses required for mere survival as well as for basic needs like good education for kids, standard of living and shrinking resources as well. Family size influences various activities in terms of family labour availability, per capita milk consumption, annual income of family etc.

4.1.1.4 Family education status

The Table-4.1 showed that 45.00 per cent of the respondents family belonged to medium education status followed by low and high which accounts 37.50 per cent and 17.50 per cent, respectively.

It was reflected in the present study that the awareness on the need of education is increasing and the farming households are moving towards the era of having a minimum educational background for the upgrading levels of technologies to cope up with their grass root level problems in the study area.

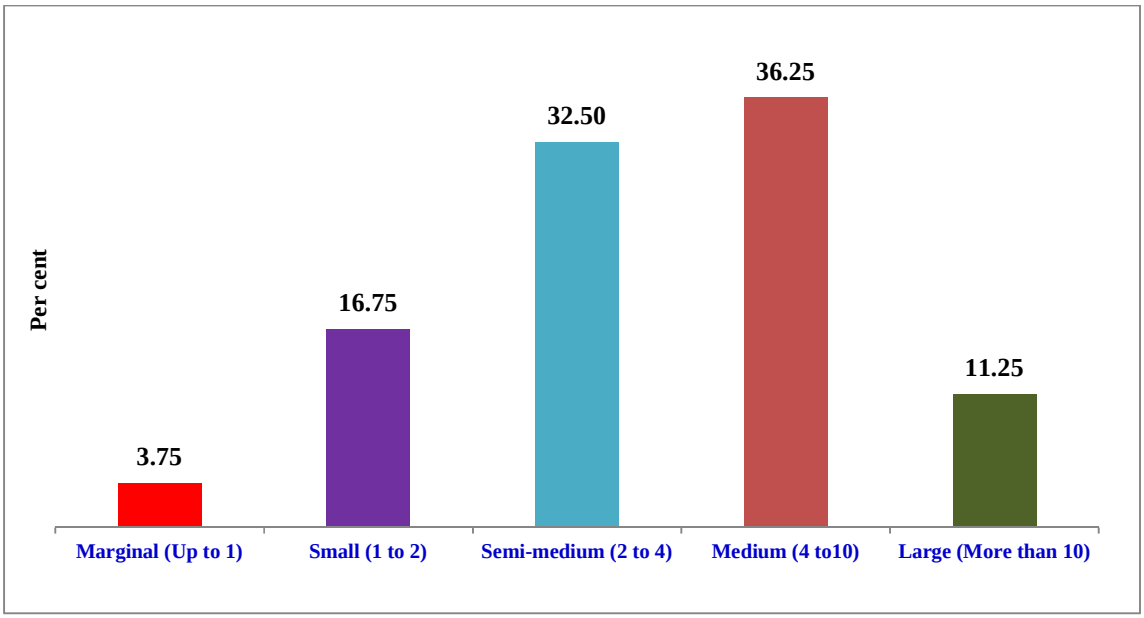

Fig-4.1: Land holding of the farmers (in ha)

4.1.1.5 Occupation

Frequency distribution of respondent's accounts to their occupation was obtained and calculated (Table-4.1) based on the source of income dairy farming as one of the major occupation of the respondents. The highest per cent of respondents (46.25%) were having Crop + Dairy as their main occupation followed by 35.00 per cent with Crop + Dairy + Service, 13.75 per cent with Crop + Dairy + Business and 5.00 per cent with Dairy + Labour as their occupation. It is interested to divulge that the occupation for the majority of the respondents as Crop + Dairy, both the enterprises are complementary and supplementary to each other.

4.1.1.6 Land holding

The Table-4.1 and Fig-4.1 revealed that 36.25 per cent of the respondents were in the category of medium land holding (4 to 10 ha), 32.50 per cent were in semi-medium (2 to 4 ha), 16.75 per cent in small (1 to 2 ha), 11.25 per cent in the category of large (more than 10 ha) and 3.75 per cent in marginal (up to 1 ha) farmers category. The average size of land holding was 5.22 ha and ranging from 0.5 to 13 in the study area.

4.1.1.7 Herd size

The classification of the respondents with respect to herd size has been presented in table-4.1. It was clearly enunciated that 40.00 per cent belonged to medium herd size category rearing up to 5-7 dairy animals. Whereas 36.25 and 23.75 per cent belonged to small and large herd size category rearing 5 to 7 and more than 7 dairy animals respectively. The average herd size calculated was 6.23 dairy animals and ranging 3 to 12 animals in the herd.

4.1.1.8 Annual income

Respondents has been classified into three categories i.e., low, medium and high annual income by using the cumulative square root frequency method and results were presented in the Table-4.1. The results showed that 46.25 per cent respondents belonged to low category (up to Rs. 230143) of income per year. Whereas, 32.50 per cent and 21.25 per cent belonged to medium (Rs. 230143 to Rs. 347154) and high (more than Rs. 347154) income category respectively. The average income of the respondents was Rs. 259450 and it ranges between Rs. 1, 20,000 to Rs. 5, 40,000 per annum in the study area.

4.1.1.9 Experience in Dairy farming

The Table-4.1 revealed that 38.75 per cent of the farmers had medium (13 to 23 years) level of experience in dairy farming. Whereas, 36.25 per cent and 25.00 per cent of farmers were having low and high level of experiences in dairy farming respectively. This may be due to the fact that most of the respondents were of middle age (36 to 50 years). The average experience in dairying in the study area was 17 years and ranging from 5 to 33 years.

Table-4.1: Profile of Farmers of dairy innovation platform

Variable	Category	Frequency (n=80)	Percentage
Age (years) Average: 42.41 Range: 18 to 76	Young (Up to 35)	22	27.50
	Middle (36 to 50)	40	50.00
	Old (More than 50)	18	22.50
Level of Education	Illiterate	8	10.00
	Functionally literate	17	21.25
	Primary	7	8.75
	Middle	27	33.75
	Secondary	15	18.75
	Senior secondary	5	6.25
	Graduate and above	1	1.25
Family size Average :4.51 Range : 3 to 12	Small (Up to 4)	21	26.25
	Medium (4 to 6)	51	63.75
	Large (More than 6)	8	10.00
Family Education Status Average: 1.98 Range: 0.75 to 4.25	Low (Up to 1.60)	30	37.50
	Medium (1.60 to 2.49)	36	45.00
	High (More than 2.49)	14	17.50

Occupation Average: 1.77 Range: 1 to 4	Crop + Dairy	37	46.25
	Crop + Dairy + Service	28	35.00
	Crop + Dairy + Business	11	13.75
	Dairy+ Labour	4	5.00
Land holding (ha) Average: 5.22 Range: 0.5 to 13	Marginal (Up to 1)	3	3.75
	Small (1 to 2)	13	16.75
	Semi-medium (2 to 4)	26	32.50
	Medium (4 to10)	29	36.25
	Large (More than 10)	9	11.25
Herd size (No.) Average: 6.23 Range: 3 to 12	Small (Up to 4)	29	36.25
	Medium (4-7)	32	40.00
	Large (more than 7)	19	23.75
Annual Income (Rs.) Average: 259750 Range: 120000 to 540000	Low (Up to 230143)	37	46.25
	Medium (230143 to 347154)	26	32.50
	High (More than 347154)	17	21.25
Dairy farming experience (years) Average: 17.49 Range: 5 to 33	Low (Up to 13)	29	36.25
	Medium (13 to 23)	31	38.75
	High (More than 23)	20	25.00

4.1.2 Profile of researchers of the dairy innovation platform

4.1.2.1 Age (in years)

The results presented in Table-4.2 indicates that half (50.00%) of the respondents were of old aged (more than 50 years) followed by the category of middle (36 to 50 years) and young (up to 35 years) which accounts for 40.00 per cent and 10.00 per cent, respectively. It might be due to that after completing required professional education they have been selected in their respective and meanwhile they reached up to like age of

30 or more. Moreover, while becoming the active member/actor of innovation platform they reached in middle age group in the study area.

4.1.2.2 Education

According to Table-4.2, it was found that absolute majority (100.00%) of the respondents were educated up to doctorate level education. It may be due to the old and middle aged researchers mostly available in their respective field of excellence.

4.1.2.3 Experience

The Table-4.1 revealed that 45.00 per cent of the respondents had high (more than 25 years) level of experience in the field of research. Whereas, 30.00 per cent and 25.00 per cent of researchers were having high and low level experiences. This may be due to the fact that most of the respondents were of old aged (more than 50 years). The average experience in dairy in the study area was 21.17 years and ranging from 8 to 37 years.

Table-4.2: Profile of Researchers of dairy innovation platform

Variable	Category	Frequency (n=20)	Percentage
Age (years) Average: 46.95 Range:33 to 55	Young (Up to 35)	2	10.00
	Middle (36 to 50 years)	8	40.00
	Old (more than 50)	10	50.00
Level of Education Average: 8.00 Range: 7 to 8	Post graduate	0	00.00
	Doctorate	20	100.00
Experience (years) Average: 21.75 Range: 8 to 37	Low (Upto19)	6	30.00
	Medium (20-25)	5	25.00
	High (More than 25)	9	45.00

4.1.3 Profile of Extension Personnel of dairy innovation platform

4.1.3.1 Age (in years)

The results presented in Table-4.3, indicates that 55.00 per cent of the respondents were of middle aged and ranging from 36 to 50 years, followed by the category of young (up to 35 years) with 45.00 percent and there were no respondents observed in the category of old aged (more than 50 years). It might be due to more involvement of extension personnel with middle aged category in the study area.

4.1.3.2 Education

According to Table-4.2, it was found that majority (55.00%) of the respondents were educated up to graduate level education, followed by 20.00 per cent, 15.00 per cent and 10.00 per cent of respondents educated up to senior secondary, post-graduate and doctorate level of education. It may be due to the fact that most of the respondents of middle and young aged opted for dairy extension personnel work.

4.1.3.3 Experience

The Table-4.3 revealed that 45.00 per cent of the respondents had medium (17 to 23 years) level of experience in the field of dairy extension activities. Whereas, 35.00 per cent and 20.00 per cent of respondents had low and high level of experience. This may be due to the fact that most of the respondents were of middle aged (36 to 50 years). The average experience in dairy extension activities was 19.45 years and ranging from 10 to 28 years.

Table-4.3: Profile of Extension Personnel in the dairy innovation platform

Variable	Category	Frequency (n=20)	Percentage
Age (years) Average: 35.75 Range: 27 to 47	Young (Up to 35)	9	45.00
	Middle (36 to 50)	11	55.00
	Old (More than 50)	0	00.00
Level of Education	Senior secondary	4	20.00
	Graduation	11	55.00
	Post-graduation	3	15.00
	Doctorate	2	10.00
Experience (years) Average: 19.45 Range: 10 to 28	Low (Up to17)	7	35.00
	Medium (18-23)	9	45.00
	High (More than 23)	4	20.00

4.1.4 Profile of Input Suppliers of dairy innovation platform

4.1.4.1 Age (in years)

The results presented in Table-4.4 indicates that 65.00 per cent of the respondents were of middle aged and ranging from 36 to 50 years, followed by the category of young (up to 35 years) with 20.00 per cent and there were 15.00 per cent of respondents observed in the category of old aged (more than 50 years). It might be due to more involvement of

input suppliers with middle aged category in the study area that dairy innovation platform required experience in their respective field.

4.1.4.2 Education

According to Table-4.4, it was found that majority (35.00%) of the respondents were educated up to middle level education, followed by 20.00 per cent, 15.00 per cent and 15.00 per cent of respondents educated up to primary, secondary and senior secondary level of education. It may be due to the fact that most of the respondents of middle and young aged liked to involve in the business of input supply and other services related to the dairy farming.

4.1.4.3 Experience

The Table-4.4 revealed that 65.00 per cent of the respondents had medium (Up to 17 years) level of experience in the field of input supply. Whereas, 25.00 per cent and 10.00 per cent of respondents had medium and high level of experiences respectively. This may be due to the fact that most of the respondents were of middle aged (36 to 50 years). The average experience in dairy in the study area was 16.30 years and ranging from 8 to 31 years.

Table-4.4: Profile of Input Suppliers in the dairy innovation platform

Variable	Category	Frequency (n=20)	Percentage
Age (years) Average: 41.90 Range: 23 to 56	Young (Up to 35)	4	20.00
	Middle (36 to 50)	13	65.00
	Old (More than 50)	3	15.00
Level of Education	Primary	4	20.00
	Middle	7	35.00
	Secondary	3	15.00
	Senior secondary	6	15.00
Experience (years) Average: 16.30 Range: 8 to 31	Low (Upto17)	13	65.00
	Medium (18 to 21)	5	25.00
	High (More than 21)	2	10.00

4.1.5 Feature of dairy farming

4.1.5.1 Composition of Dairy animal

The result in Table-4.5 a, indicates that the respondents had indigenous cattle, cross breed cows and buffaloes 1.36, 2.69 and 2.18 average dairy animals per household respectively. Average dairy animals per household were 6.23. It is quite clear that farmer of the study area preferred crossbreds and buffaloes instead of indigenous cows. In the study area from Fig-4.2, it was observed that 34.84, 43.17 and 21.89 per cents of

buffaloes, crossbred cows and indigenous cattle respectively were contributing to livestock around 60.24 per cent of animals in milk type of animals, 18.27 per cent of animals were heifers, 10.04 per cent of animals were dry, 8.84 per cent of animals were young stock and 2.61 per cent of animals were males in the herds of buffaloes, crossbreeds and indigenous cattle. This is due to the fact that the dairy farmer reared more crossbreeds and buffaloes due to high milk production and HF, crosses and Murrah buffaloes were prominent in the study area.

Table-4.5 a: Composition of Dairy animal

Particulars	Indigenous cow	Cross breed cow	Buffalo	Total (n=80)
In milk	73	131	96	300
Heifer	15	43	33	91
Dry	10	14	26	50
Young stock	5	23	16	44
Male	6	4	3	13
Total	109	215	174	498

4.1.5.2 Milk Production (in total)

The Table-4.5 b, revealed total milk production was 1200 litres per day, 2004.30 litres per day and 481.07 litres per day in buffaloes, cross breeds and indigenous cattle respectively. The results in the table shows that the average milk production in litre per household per day was 15, 25.05 and 6.01 in buffaloes, crossbreeds and indigenous cattle respectively. The table also revealed that the average milk production in litre per animal per day was 12.50, 15.30 and 6.59 in buffaloes, crossbreeds and indigenous cattle. The findings were similar to Meena *et al*., (2016), which showed that ADMY (Average Daily Milk Yield) was 5.75±0.65 lit/day/animal.

Table-4.5 b: Milk Production (in total)

Particulars	Indigenous cow	Cross breed cow	Buffalo	Total (n=80)
Average dairy animals/ household	1.36	2.69	2.18	6.23
Total milk production (litre/day)	481.07	2004.3	1200	3685.37
Average milk production (litre/house hold/day)	6.01	25.05	15.00	46.06
Average milk production (litre/animal/day)	6.59	15.30	12.50	34.39

4.1.5.3 Milk Production

The Table-4.6 revealed that 56.25 per cent of the farmers fell in medium categories of milk production and producing 37 to 59 litres of milk per day followed by 25.00 per cent and 18.75 per cent of the farmers belonged to low and high categories of milk production. On average milk production per household was 46.08 litres of milk per day; however few farmers were producing 86 litres of milk per day from their dairy animals. This might be due to the influence of dairy innovation platform actively working for dairy perspectives in the vicinities of the study areas.

4.1.5.4 Milk Consumption

From the milk consumption data, depicted in Table-4.6 it could be observed that 42.5 per cent of respondents fell in the medium category of milk consumption retaining 6 to 9 litres milk per day for their home consumption. Similarly there were about 40.00 per cent and 17.70 per cent of the farmers whose home consumption has less than 6 litres and more than 9 litres of milk per day respectively. On an average consumption per household was 7.35 per cent of milk per day.

4.1.5.5 Milk Sale

A cursory look on the milk sale data in the Table-4.6 indicates that the majority 42.50 per cent farmers were selling 27 to 50 litres of milk per day and 38.75 per cent were selling up to 27 litres milk per day and there were 18.75 per cent farmers who sold more than 50 litres of milk per day. On average milk sale per household was 37.58 litres of milk per day and ranging from 5 to 79 litres of milk per day.

Table-4.6: Distribution of dairy farmers according to Milk production, Consumption and Sale

Particulars		Category	Frequency (n=80)	Percentage
A)	Milk Production (litres) Mean= 46.08 Range= 15 to 86	Low (Up to 37)	15	18.75
		Medium (38-59)	45	56.25
		High (More than 59)	20	25.00

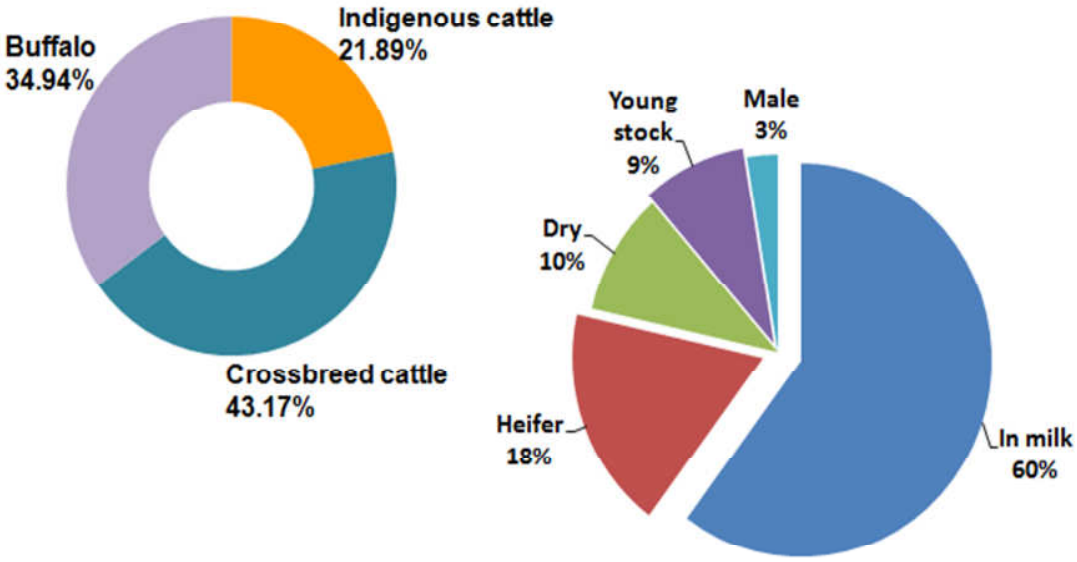

Fig-4.2: Composition of Dairy animal in the study area of Haryana

B)	Milk Consumption (litres) Mean= 7.35 Range= 4 to 14	Low (Up to 6)	32	40.00
		Medium (7-9)	34	42.50
		High (More than 9)	14	17.70
C)	Milk Sale (litres) Mean= 37.58 Range= 5 to 79	Low (Up to 27)	31	38.75
		Medium (28-50)	34	42.50
		High (More than 50)	15	18.75

4.1.6 Cropping Intensity

From Table-4.7 it was observed that maximum of farmers fell in the medium category (219 to 248) of cropping intensity followed by low category (up to 218) with 31.25 per cent and in high category (more than 248) with 23.75 per cent of the farmers. This indicates that almost one forth farmers were taking three crops in a year i.e., paddy, wheat and in summer vegetables.

Table-4.7: Distribution of Cropping Intensity

Cropping Intensity	Frequency (n=80)	Percentage
Low (Up to 218)	25	31.25
Medium (219 to 248)	36	45.00
High (More than 248)	19	23.75
Mean: 230.66		Range: 175 to 300

4.2 Dynamic of actors involved in scientific dairying

4.2.1 Dissemination of dairy information to farmers

There were three main actor of dairy innovation platform i.e. Researcher, Extension personnel and Input suppliers. Most of the receive information on dairy farming from the three actors at innovation platform. The bird eye view on Fig-4.3 reveals the researchers disseminated maximum information in animal feeding practices

(73.33%), extension personnel disseminated maximum information in animal breeding practices (82.00%), even Mohammad et al., 2012, reported that the role of extension personnel is more proactive in disseminating important information related to dairy farming. Further it was viewed that input suppliers disseminated maximum information in animal breeding practices (78.00%). In overall the maximum dairy information disseminated by the actors was on animal breeding practices (76.22%). Hence it was observed that more likely all the actors are actively engaged in disseminating dairy information to farmers. The similar findings was reported by Adenkule and Fatunbi, (2012), which ensures that all partners have a contribution to make and an obvious benefit derive from the activities of Innovation Platform.

4.2.1.1 Dissemination of animal breeding information to farmers

The data was further analyzed and presented in Table-4.8, it was observed that majority of the information was disseminated by input suppliers (88.33%) on selective/cross breeding methods for breed improvement followed by in majority was disseminated by extension personnel (85.00%) among the animal breeding practices. The maximum information disseminated by the researchers was on selective/cross breed improvement aspects (73.33%). In overall dissemination of information from dairy innovation platform it was observed that the maximum information was disseminated by extension personnel (82.00%). In animal breeding practices, the majority of the information disseminated by different actors was on selective/cross breed improvement aspects (82.22%).

4.2.1.2 Dissemination of animal feeding information to farmers

In the field of animal feeding majority of the information was disseminated by researchers (86.67%) and extension personnel (86.67%) for composition of concentrates. The data presented in the Table-4.8 further revealed that 86.67 percentage of information on mineral mixture was disseminated by input suppliers. In overall dissemination of information from dairy innovation platform it was observed that the maximum information was disseminated by extension personnel (74.17%). In animal feeding practices, the majority of the information disseminated by different actors was on composition of concentrates (85.00%) and mineral mixture.

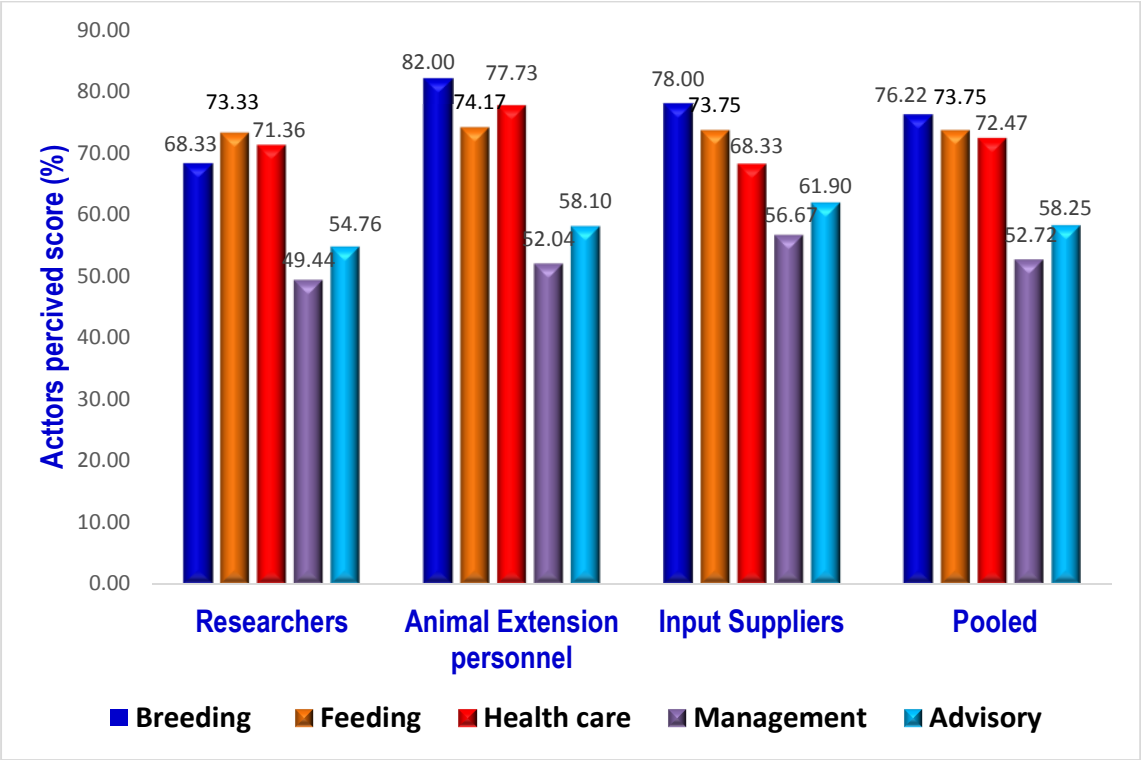

Fig-4.3: Dissemination of dairy information to farmers

4.2.1.3 Dissemination of animal healthcare information to farmers

The cursory look on Table-4.8 reveals that same majority of the information was disseminated by extension personnel (88.33%) on mastitis control, followed by was disseminated by input suppliers (83.33%). It was also observed that maximum information about control of endo-parasite (83.33%) and vaccination (83.33%) were disseminated. In overall dissemination of information from dairy innovation platform it was observed that the maximum information was disseminated by extension personnel (77.73%). In animal healthcare practices, the majority of the information disseminated by different actors was on mastitis control (83.89%).

4.2.1.4 Dissemination of dairy management information to farmers

The collected data was further analyzed and presented in Table-4.8. It was found that majority of the information was disseminated by input suppliers (65.00%) on housing system, followed by the information disseminated was on control of mosquito, ticks etc. and milking machines by input suppliers (60.00%). It was also observed that maximum information about cleaning of cattle shed were disseminated by researchers (58.33%). In overall dissemination of information from dairy innovation platform it was observed that the maximum information was disseminated by input suppliers (56.67%). In animal healthcare practices, the majority of the information disseminated by different actors was on housing systems (83.89%).

4.2.1.5 Dissemination of advisory services information to farmers

The Table-4.8 reveals that majority of the information was disseminated by researchers (78.33%) on training, followed by the information disseminated was on control linkage creation by input suppliers (68.33%). It was also observed that there was maximum information about linkage creation by input suppliers (58.33%). In overall dissemination of information from dairy innovation platform it was observed that the maximum information was disseminated by researchers (61.90%). In animal advisory services, the majority of the information disseminated by different actors was on training (65.56%). While data collection it was noticed that farmers were eager to know more and more about the scientific dairy farming and wants information on training, project proposals etc.

Table-4.8: Dissemination of dairy information to farmers

Particulars		Average weighted score (in %)			
		Researchers (n=20)	Extension personnel (n=20)	Input suppliers (n=20)	Pooled (n=60)
ANIMAL BREEDING					
Proper time of insemination		65.00	83.33	76.67	75.00
Service period		68.33	78.33	75.00	73.89
Pregnancy diagnosis		66.67	80.00	70.00	72.78
Breed improvement	Selective/cross	73.33	85.00	88.33	82.22
	Up-gradation	68.33	83.33	80.00	77.22
Overall		68.33	82.00	78.00	76.22
ANIMAL FEEDING					
Concentrate feeding		75.00	81.67	78.33	78.33
Composition of concentrates		86.67	86.67	81.67	85.00
Fodder		71.67	81.67	76.67	76.67
Silage		93.33	80.00	73.33	82.22
Mineral mixture		85.00	83.33	86.67	85.00
Colostrum feeding		78.33	78.33	73.33	76.67
Quantity and type of green fodder		40.00	43.33	58.33	47.22
Feed supplements		56.67	58.33	61.67	58.89
Overall		73.33	74.17	73.75	73.75
ANIMAL HEALTHCARE					
Naval cord		70.00	81.67	56.67	69.44
Disbudding		56.67	56.67	53.33	55.56

Control of endo-parasite	83.33	76.67	75.00	78.33
Control of ecto-parasite	56.67	58.33	68.33	61.11
Disease/disorder treatment	58.33	76.67	76.67	70.56
First aid kit	81.67	81.67	56.67	73.33
Vaccination	83.33	80.00	73.33	78.89
Prolapse management	70.00	81.67	61.67	71.11
Treatment of anoestrus and repeat breeding	71.67	81.67	81.67	78.33
Mastitis control	80.00	83.33	88.33	83.89
Abortion control	73.33	80.00	60.00	71.11
Overall	71.36	77.73	68.33	72.47
DAIRY MANAGEMENT PRACTICES				
Clean milk production	41.67	41.67	55.00	46.11
Housing system	50.00	58.33	65.00	57.78
Control of mosquito, ticks etc.	48.33	60.00	61.67	56.67
Bedding material	50.00	58.33	58.33	55.56
Cleaning of cattle shed	58.33	53.33	58.33	56.67
Milking machines	53.33	60.00	61.67	58.33
Manure management system	56.67	51.67	55.00	54.44
Farm records	41.67	43.33	46.67	43.89
Extreme weather control	45.00	41.67	48.33	45.00
Overall	49.44	52.04	56.67	52.72
ADVISORY SERVICES				
How to start dairy	61.67	45.00	55.00	53.89
Training	78.33	66.67	51.67	65.56
Marketing	56.67	61.67	56.67	58.33

Linkage creation	61.67	68.33	58.33	62.78
Meetings/ Kisanmandal/ Kisanghosti	58.33	60.00	55.00	57.78
Demonstrations	53.33	53.33	46.67	51.11
Field trip/field day	63.33	51.67	60.00	58.33
Overall	61.90	58.10	54.76	58.25

4.2.2 Sharing of information by the actors at dairy innovation platform

The data was further analyzed to know the sharing of dairy information among the actors of Dairy Innovation Platform. The Table-4.9 showed that for the sharing of dairy information the researchers (27.87%) shared maximum information on animal breeding practices, input suppliers (25.53%) shared maximum information on animal feeding practices, extension personnel (27.58%) shared maximum information on animal healthcare practices. It was also observed that extension personnel (26.25%) shared maximum information on dairy management practices, as Kilelu *et al.,* (2013), reported that the Innovation Platform was effective with different innovation intermediaries enabling them to be complementary and help in monitoring adaptive management of innovation. In overall, it can be inferred that the dairy information shared by the actors from dairy innovation platform was maximum by extension personnel.

4.2.2.1 Sharing of information on animal breeding practices

A cursory look on Table-4.9, reveals that there was increased share of information by researcher (30.62%) followed by the maximum information shared on service period by extension personnel (28.95%). Further, the maximum information shared by farmer (26.77%) on pregnancy diagnosis and input suppliers on breed improvement (24.23%).

4.2.2.2 Sharing of information on animal feeding practices

From the table-4.9, it reveals that there was increased share of information by input suppliers (28.57%) on silage followed by the maximum information shared on mineral mixture by researcher (28.45%). Further, the maximum information shared by farmer (28.10%) on feed supplements and extension personnel on quantity and type of green fodder (26.29%).

4.2.2.3 Sharing of information on animal healthcare practices

From the Table-4.9, it showed that there was increased share of information by input suppliers (30.59%) on naval cord treatment followed by the maximum information shared on treatment of anoestrus and repeat breeding by researcher (30.55%). Further, the maximum information shared by farmer (25.55%) on prolapsed management and extension personnel (26.29%). on disbudding

4.2.2.4 Sharing of information on dairy management practices

The collected data was further analyzed and presented in Table-4.9. It was found that there was increased share of information by extension personnel (30.66%) on Control of mosquito, ticks etc. followed by the maximum information shared on extreme weather control by researchers (30.47%). Further, the maximum information shared by farmer (26.44%) on clean milk production and input suppliers (26.00%) on milking machines.

Table-4.9: Sharing of information by the actors at dairy innovation platform

Particulars		Researcher	Extension personnel	Input supplier	Farmer
Breeding	Proper time of insemination	29.71	22.34	19.26	28.69
	Service period	27.24	28.95	21.52	22.29
	Pregnancy diagnosis	23.98	26.55	22.70	26.77
	Breed improvement	30.62	22.47	24.23	22.69
	Pooled	27.87	25.18	21.87	25.08
Feeding	Concentrate feeding	27.33	23.56	24.44	24.67
	Composition of concentrates	25.43	23.48	25.65	25.43
	Fodder seeds	23.79	24.71	26.79	24.71
	Silage	22.08	24.24	28.57	25.11
	Mineral mixture	28.45	24.48	23.43	23.64
	Colostrum feeding	25.93	24.07	25.93	24.07
	Quantity and type of green fodder	23.71	26.29	25.35	24.65
	Feed supplements	23.57	24.29	24.05	28.10
	Pooled	25.08	24.37	25.53	25.02

Health care	Naval cord	23.43	30.59	21.04	24.95
	Disbudding	26.54	23.87	26.34	23.25
	Control of endo &ecto parasite	25.40	30.89	22.65	21.05
	First aid kit	22.82	26.59	25.18	25.41
	Vaccination	27.54	28.22	23.02	21.22
	Prolapse management	24.82	25.30	24.33	25.55
	Treatment of anoestrus and repeat breeding	30.55	27.09	20.57	21.79
	Mastitis control	25.61	29.97	21.78	22.65
	Abortion control	24.20	25.11	25.34	25.34
	Pooled	25.73	27.58	23.28	23.40
Management	Clean milk production	24.52	25.96	23.08	26.44
	Control of mosquito, ticks.	24.10	30.66	21.35	23.89
	Bedding material	26.08	24.49	24.72	24.72
	Cleaning of cattle shed	26.76	29.78	22.54	20.93
	Milking machines	24.53	23.90	26.00	25.58
	Manure management system	26.05	27.32	20.58	26.05
	Farm records	23.94	25.35	25.82	24.88
	Extreme weather control	30.47	22.09	20.04	27.40
	Pooled	25.88	26.25	22.90	24.97

4.3 UTILIZATION OF INFORMATION SOURCES AND THEIR CREDIBILITY

There are many sources existing in our country that are disseminating the information to the farmers. Hence, an effort was made to know the utilization, sources and their credibility in the field of dairy farming and it was discussed under the following subheads

4.3.1 Utilization of information source by farmers on dairy farming

From the Table-4.10 it was revealed that on animal breeding practices the maximum information utilized by farmers from progressive farmers (76.67%) followed by utilized from VO (70.33%). On animal feeding practices maximum information utilized by farmers from progressive farmers (77.00%) followed by utilized from VO (71.00%). Further when observed, it revealed that on animal healthcare practices also maximum information utilized by farmers from progressive farmers (77.67%) followed by utilized from VO (78.75%) and on dairy management practices maximum information utilized by farmers from progressive farmers (75.33%) followed by utilized from drug vendors (76.00%). The utilization of information source by farmers on dairy farming practices was utilized maximum from progressive farmers (76.67%), followed by from VO (73.33%). It was observed that maximum information utilized by farmers was from progressive farmers and farmers themselves that was similar to the findings reported by Demiryurek *et al.*, (2008), showed that the lack of information support from the institutional sources resulted in the development of personal information sources.

Table-4.10: Utilization of information source by farmers on dairy farming

Particulars	Animal Breeding	Animal Feeding	Animal Healthcare	Dairy management practices	Pooled (n=80)
SMS	1.8 (60.00)	1.96 (65.33)	1.94 (64.67)	1.63 (54.33)	1.83 (61.08)
VO	2.11 (70.33)	2.13 (71.00)	2.36 (78.75)	2.20 (73.33)	2.20 (73.33)
KVK	1.79 (59.58)	1.73 (57.50)	1.85 (61.75)	1.51 (50.42)	1.72 (43.00)
Dairy Cooperative and milk plant	1.81 (60.33)	2.04 (68.00)	1.93 (64.33)	2.05 (68.33)	1.96 (65.25)
NGO	1.8 (60.00)	1.65 (55.00)	1.61 (53.67)	1.78 (59.33)	1.71 (57.00)
Feed and dairy equipment suppliers	1.88 (62.67)	2.04 (68.00)	1.90 (63.33)	1.95 (65.00)	1.94 (64.75)
Drug vendors	2.03 (67.67)	2.11 (70.33)	2.23 (74.33)	2.28 (76.00)	2.16 (72.08)
Progressive farmers	2.30 (76.67)	2.31 (77.00)	2.33 (77.67)	2.26 (75.33)	2.30 (76.67)

(Per cent in parenthesis)

4.3.2 Credibility of information source by farmers on dairy farming practices

From the Table-4.11 it was revealed that on animal breeding practices the maximum credibility of information source by farmers was from progressive farmers (72.00%) followed by information source was credible from feed & dairy equipment suppliers (69.67%). On animal feeding practices maximum credibility of information source by farmers was from progressive farmers (80.00%) followed by information source was credible from feed & dairy equipment suppliers (71.67%). Further when observed, it revealed that on animal healthcare practices also maximum credibility of information source by farmers was from progressive farmers (76.00%) followed by information source credible was from drug vendors (73.33%) and on dairy management practices maximum credibility of information source by farmers was from progressive farmers (74.33%) followed by information source credible was from feed & dairy equipment suppliers (73.67%). The credibility of information source by farmers on dairy farming practices was having maximum credibility from progressive farmers (75.58%), followed by from feed & dairy equipment suppliers (71.08%).

Table-4.11: Credibility of information source by farmers on dairy farming

Particulars	Animal Breeding	Animal Feeding	Animal Healthcare	Dairy management practices	Pooled (n=80)
SMS	1.80 (60.00)	1.83 (61.00)	1.51 (50.33)	1.78 (59.33)	1.73 (57.67)
VO	1.94 (64.67)	1.98 (66.00)	2.19 (73.00)	2.08 (69.33)	2.05 (68.25)
KVK	1.93 (64.33)	1.94 (64.67)	1.84 (61.33)	1.66 (55.33)	1.84 (61.42)
NGO	1.80 (60.00)	1.58 (52.67)	1.54 (51.33)	1.81 (60.33)	1.68 (56.08)
Dairy cooperatives and milk plant	1.88 (62.67)	1.88 (62.67)	1.76 (58.67)	1.93 (64.33)	1.86 (62.08)
Feed and dairy equipment suppliers	2.09 (69.67)	2.15 (71.67)	2.08 (69.33)	2.21 (73.67)	2.13 (71.08)
Drug vendors	1.96 (65.33)	2.04 (68.00)	2.20 (73.33)	2.14 (71.33)	2.08 (68.50)
Progressive farmers	2.16 (72.00)	2.40 (80.00)	2.28 (76.00)	2.23 (74.33)	2.27 (75.58)

(Per cent in parenthesis)

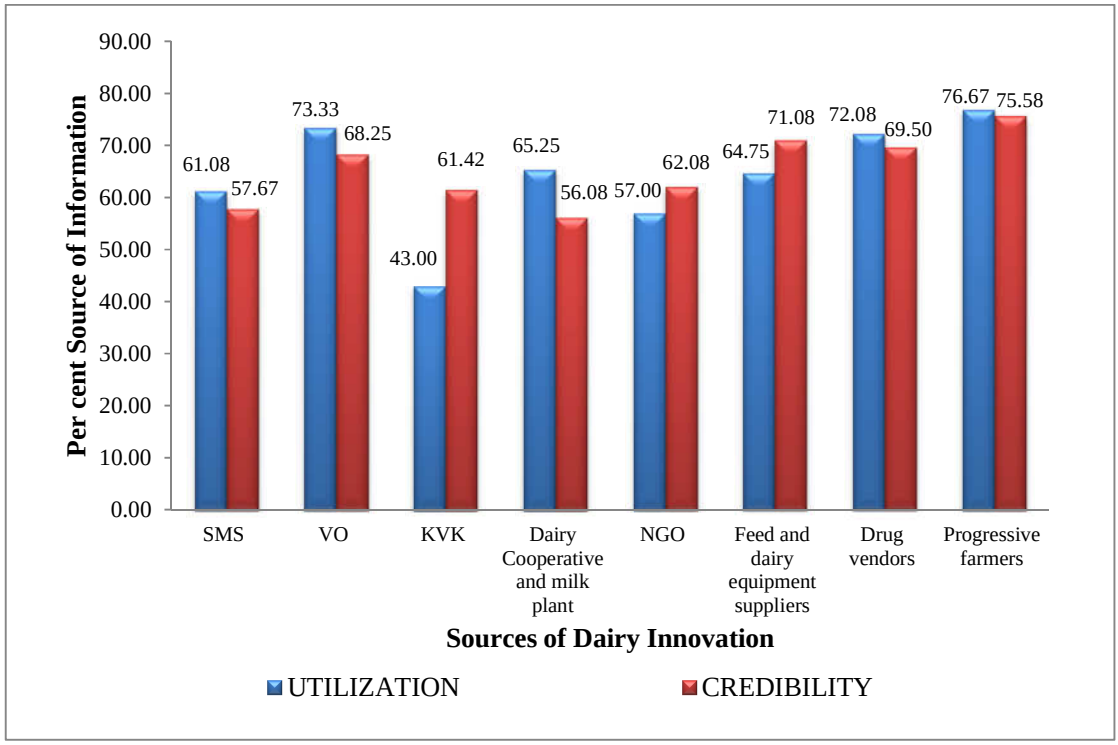

Fig-4.4: Utilization information source and their credibility by farmers on dairy farming practices

From the above discussions and a look on Fig-4.4 reveals that information source by farmers on dairy farming was maximum from progressive farmers with 76.67% utilization & 75.58% credibility, while KVK with good credibility (61.42%) was utilized lowest (43.00%). This might be due to the fact that farmers believing in practical experience of progressive farmers and their availability in the proximity of the study area .Further it showed that VO with 72.33 per cent utilization having 68.25 per cent credibility, drug vendors with 72.08 per cent utilization having 69.50 credibility, dairy cooperatives & milk plant with 65.25 per cent utilization having 56.08 per cent credibility, feed & dairy equipments suppliers with 64.75 per cent utilization having good credibility of 71.08 per cent, SMS with 61.08 per cent utilization having 57.67 per cent credibility and NGO with 57.00 per cent of utilization having 62.08 per cent credibility.

4.3.4 Credibility of actors in Dairy Innovation Platform

The method of Successive Interval Scaling technique developed by Thurston was used to develop the credibility scale of actors in dairy innovation platform.

Table-4.12: Credibility Scale of actors in Dairy Innovation Platform

Sl. No.	Statements (n=60)	Scale values
1	Resource person are more credible in providing information required by actors of dairy innovation platform.	3.53
2	Scientists and veterinary officers are more credible to the farmers.	3.68
3	Dairy farmers most often use the information from fellow farmers as they are most credible.	3.44
4	Farmers prefers Dairy Mela/Pasu palan mela(PPM) for source of information	3.43
5	Non-local communication channels involves the highest search costs to get the needed information	1.77
6	The use of local channels is declining over a period	2.04
7	Increasing literacy rate results in increased utilization by the farmers	2.66

The calculated average discrepancy of the developed scale from Table-4.12 was **0.03** which indicated the higher level internal consistency of the developed scale.

4.3.4.1 Credibility of actors

From Table-4.13 it was revealed that among the actors significantly higher credibility was recorded on input suppliers ($77.61^{c} \pm 1.45$) over extension personnel ($74.75^{b} \pm 1.37$) and researchers ($72.26^{a} \pm 1.39$).

Means with same superscript in the column indicated non-significant differentiation in terms of credibility of information provided by the different actors. Multiple comparisons were done based on the DMRT (Duncan's Multiple Range Test) at 5 percent level of significance.

Table-4.13: Credibility of Dairy actors

Sl. No.	Actors (n=60)	Credibility (Mean ± S.E)
1	Researchers	$72.26^{a} \pm 1.39$
2	Extension personnel	$74.75^{b} \pm 1.37$
3	Input suppliers	$77.61^{c} \pm 1.45$

4.3.4.2 Credibility of Dairy Innovation platform as perceived by the actors

From Table-4.14 it was observed that the credibility of actors as told by the actors of dairy innovation platform on "Resource person are more credible in providing information required by actors of dairy innovation platform" was maximum from researcher (80.00%) followed by from extension personnel (80.00%) and input suppliers (78.00%). Further it revealed that the credibility of actors on "Scientists and veterinary officers are more credible to the farmers" was maximum from researcher (89.00%) followed by from extension personnel (86.00%) and input suppliers (84.00%). The credibility of actors on "Dairy farmers most often use the information from fellow farmers as they are most credible" was maximum from input suppliers (81.00%) followed by from researcher (79.00%) and extension personnel (74.00%). The credibility of actors on "Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information" was same from both extension personnel (91.00%) and input suppliers (91.00%) followed by from researchers (89.00%). The credibility of actors on "Non-local communication channels involve the highest search costs to get the needed information" was maximum from researcher (52.00%) followed by from extension personnel (46.00%) and input suppliers

(45.00%). The credibility of actors on "The use of local channels is declining over a period" was maximum from researcher (56.00%) followed by from extension personnel (55.00%) and input suppliers (50.00%). The credibility of actors on "Increasing literacy rate results in increased utilization by the farmers" was maximum from input suppliers (71.00%) followed by from extension personnel (71.00%) and researcher (51.00%).

Among all the seven statements of scale the maximum credibility of actors was 90.33 per cent on "Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information". As all the actor of platform fully active during these activities.

Table-4.14: Credibility of Dairy Innovation platform as perceived by the actors

Sl. No.	Statements (n=60)	Researcher	Extension Personnel	Input Supplier	Pooled
1	Resource person are more credible in providing information required by actors of dairy innovation platform.	85.00	80.00	78.00	81.00
2	Scientists and agriculture officers are more credible to the farmers.	89.00	86.00	84.00	86.33
3	Dairy farmers most often use the information from fellow farmers as they are most credible.	79.00	74.00	81.00	78.00
4	Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information	89.00	91.00	91.00	90.33
5	Non-local communication channels involves the highest search costs to get the needed information	52.00	45.00	46.00	47.67
6	The use of local channels is declining over a period	56.00	50.00	55.00	53.67
7	Increasing literacy rate results in increased utilization by the farmers	51.00	71.00	85.00	69.00

4.4 CHANGE IN SCIENTIFIC DAIRY FARMING

To see the effect of dairy innovation platform in the study area data was collected on the change in selected technologies over a period of five years.

4.4.1 Animal Breeding

The technological changes in breeding practices of dairy animals as implied by extent of adoption of afore said practices by the respondents over a period of five years. The extent of technology information of animal breeding method of dairy animal was improved from 2012-13 to 2017-18.

4.4.1.1 Heat detection and Insemination

A cursory look on the data analyzed and presented in Table-4.15, reveals that in the method of heat detection, the increase in percent change of 24.59 per cent of respondents in bellowing, restless, mounting on animals was observed. Frequent urination and vaginal discharge practices were observed. Moreover, it was observed that breeding of dairy animals was mostly done by Artificial Insemination (AI) method by increase in self involvement of dairy farmers with percent change of 80.65 per cent of respondents. In case of number of service per conception it was observed that there was decrease from 4 to 3 with percent change in 83.33 per cent of respondents. It was also observed that there was increase in frequency of insemination for 2 with a percent change of 36.00 per cent of respondents.

4.4.1.2 Pregnancy diagnosis

From Table-4.15 it was revealed that results were quite satisfactory in the technical change of pregnancy diagnosis of dairy animals. In the method of sign of pregnancy, there was increase in pregnancy diagnosis by veterinarian, *paravet*, VLDA with per cent change of 19.64 per cent of respondents.

4.4.1.3 Breed improvement

From Table-4.15, it was revealed that in the breeding and selection of type of breed, it was observed that there was increase in the respondents adopting selective/crossbreeding practice (9.09%) and crossbred cow selection (30.00%) respectively. It was clearly observed that the self involvement in the collection of the

germplasm increased by percent change in 55.56 per cent of the respondents. It can be attributed to higher level of awareness among the farmers and availability of improved breeds such as HF cross and Murrah buffalo.

Table-4.15: Change in selected technologies of animal breeding

Technology Information	Particulars		2017-18 (n=80)	2012-13 (n=80)	Per cent change
Heat detection & Insemination	Method of heat detection	Bellowing, Restless,and Mounting on animals	19 (23.75)	34 (42.50)	-78.95
		Bellowing, Restless, Mounting on animals, Frequent urination, Vaginal Discharge	61 (76.25)	46 (57.50)	24.59
	Person	Self involved	31 (38.75)	6 (7.50)	80.65
		Doctor/VLI	49 (61.25)	74 (92.50)	-51.02
	Number of services/ Conception	3	50 (62.50)	25 (31.25)	50.00
		4	30 (37.50)	55 (68.75)	-83.33
	Frequency of insemination	1	43 (53.75)	44 (55.00)	-2.33
		2	25 (31.25)	16 (20.00)	36.00
		More than 2	12 (15.00)	20 (20.00)	-66.67
Pregnancy Diagnosis	Sign of pregnancy	Self Observation	24 (30.00)	35 (43.75)	-45.83
		Pregnancy Diagnosis by Veterinarian, *Paravet*, VLDA	56 (70.00)	45 (56.25)	19.64

Breed Improvement	Breeding	Selective/Cross breeding	55 (68.75)	50 (62.50)	9.09
		Upgradation	25 (31.25)	30 (37.50)	-20.00
	Type of breed	Indigenous breed	20 (25.00)	38 (47.50)	-90.00
		Cross breed	60 (75.00)	42 (52.50)	30.00
	Germplasm collection	Self involvement	9 (11.25)	4 (5.00)	55.56
		Animals from institutes/firms	11 (13.75)	9 (11.25)	18.18
		Cooperatives/ farmers	12 (15.00)	14 (17.50)	-16.67

(Per cent in parenthesis)

From all above discussions it is clear that in the extent of adoption of animal breeding practice, moderate change was observed. Whereas the extent of involvement of person for heat detection and insemination was increased with method of heat detection by bellowing, restless, mounting on animals, frequent urination and vaginal discharge. It was observed that there was decrease in number of services/conception and decrease in frequency of insemination. In pregnancy diagnosis there was moderate increase in diagnosis by veterinarian, paravet and VLDA. In breed improvement it revealed that more selective/cross breeding were selected with more involvement of crossbred cows and increase in self involvement for germplasm collection. In overall extent of adoption of breeding practices of dairy animals, it is clear that there is an incremental technological change in breeding practices of dairy animals.

4.4.2 Animal Feeding

The data in the Table-4.16 indicates the technological changes in feeding practices of dairy animals implied by extent of adoption by respondents over different period of time.

4.4.2.1 Concentrate feeding

A cursory look on the data analyzed and presented in Table-4.16, reveals that the average quantity per milch animal was reduced by percent change of 3.23 per cent. In the number feeding, 3 times a day was increased by percent change in 25.53 per cent of respondents.

4.4.2.2 Composition of concentrates

The data in the Table-4.16 showed that concentrates purchase was increased by percent change in 45.95 per cent of respondents with increase in percent change of usage in pellets over cakes with 8.51 per cent of respondents.

4.4.2.3 Green fodder and Dry fodder

The data from Table-4.16 showed that there was increase in the percent change in quantity of consumption of green fodder and dry fodder with per cent change in 30.00 per cent and 16.67 per cent of the respondents respectively.

4.4.2.4 Feed supplements

From the Table-4.16 it reveals that there was increase in all the feed supplements of Ca, Common salt, mineral mixture with a per cent change in 33.33 per cent, 14.81 per cent and 20.59 per cent of the respondents respectively.

Table-4.16: Change in selected technologies of animal feeding

Technology Information	Particulars		2017-18 (n=80)	2012-13 (n=80)	Per cent change
Concentrate Feeding	Quantity	kg/milch animal	2.48	2.56	-3.23
	No. of feeding	2	33 (16.25)	45 (18.75)	-36.36
		3	47 (58.75)	35 (25.00)	25.53

Composition of Concentrates	Concentrate preparation	Self preparation + Purchased	18 (22.50)	42 (52.50)	-133.33
		Self preparation	25 (31.25)	18 (22.50)	28.00
		Purchased	37 (46.25)	20 (25.00)	45.95
	Cakes/ Pellets	Cakes	33 (41.25)	37 (46.25)	-12.12
		Pellets	47 (58.75)	43 (53.75)	8.51
Green Fodder	Quantity	kg/animal	20	14	30.00
Dry Fodder	Quantity	kg/animal	6	5	16.67
Feed Supplements		Ca	6 (7.50)	4 (5.00)	33.33
		Common Salt	27 (33.75)	23 (28.75)	14.81
		Mineral Mixture	34 (42.50)	27 (33.75)	20.59

(Per cent in parenthesis)

From all above discussions it is clear that, in the extent of adoption of animal feeding practice, drastic change is not observed, it might be due to is some extent change in extension activities intended to raise farmers awareness regarding the concentrate feeding is imperative. It was observed that the extent of average quantity of concentrate feeding was decreased. Further, even the number of concentrates was also decreased from three times. Whereas the extent of involvement of composition of concentrates fed to milking animals/day was having moderate change might be due to the awareness among farmers and availability of mineral mixture, moreover there was increase in purchase and involvement of pellets in feeding as per the recommendations. With respect to green fodder and dry fodder, the average quantity was increased to get improved milk yield.

With regards to extent of adoption of feed supplements, it was a positive change in Ca, Common salt and mineral, there is above moderate change which may be contributed by knowledge of feed supplements requirement of animals among the farmers. In overall extent of adoption of feeding practices of dairy animals, it is clear that there is an incremental technological change in feeding practices of dairy animals.

4.4.3 Animal Healthcare

4.4.3.1 Naval cord treatment

From the Table-4.17, it reveals that there was increase in the usage and application of the antiseptic solution with increase in percent change of 25.37 per cent of respondents.

4.4.3.2 Disbudding

The data from Table-4.17 showed that there was increase in the percent change in electric bud remover method for disbudding of dairy animals with per cent change of 27.66 per cent of respondents. The healing time after disbudding was reduced from 20 days to 15 days was observed with a percent change of 33.33 per cent of respondents.

4.4.3.3 Control of Endo parasites

The data from Table-4.17, it reveals that the faeces consistency method was increased with 13.64 per cent of respondents for diagnosis of endo-parasites. It was observed that there was increase in the application of injection for the control of endo-parasites with percent change in 36.36 per cent of respondents.

4.4.3.4 Control of Ecto-parasites

From the Table-4.17, it showed that there was positive change in method of diagnosis of ecto-parasites by insect observation, skin abrasions and involvement of doctor/VLI with percent change in 4.00 per cent, 35.48 per cent and 50.00 per cent of respondents. It was also observed that there was increase in the external application and injection with percent change of 48.39 percentage and 46.67 percentage of respondents.

4.4.3.5 First aid kit

It was observed from the data analyzed and presented in the Table-4.17 that there was increase in knowledge of basic and components of first aid kit by the respondents with percent change of 22.86 per cent.

4.4.3.6 Vaccination

The Table-4.17 revealed that there was increase in the animals vaccinated for black quarter, anthrax, HS etc. by the respondents with percent change of 16.92 per cent.

Table-4.17: Change in selected technologies of animal healthcare

Technology Information	Particulars		2017-18 (n=80)	2012-13 (n=80)	Per cent change
Naval cord treatment	Application of Aseptic (ointment/s)	Local resource	13 (16.25)	30 (37.50)	-130.77
		Antiseptic solution	67 (83.75)	50 (62.50)	25.37
Disbudding	Methods of disbudding	Electrical bud remover	47 (58.75)	34 (42.50)	27.66
		Hot iron rod burning	22 (27.50)	37 (46.25)	-68.18
		Caustic method	11 (13.75)	9 (11.25)	18.18
	Healing time	Days	15	20	-33.33
Control of Endo Parasite	Method of diagnosis	Faeces consistency	44 (55.00)	38 (47.50)	13.64
		Doctor/VLI	36 (45.00)	42 (52.50)	-16.67
	Application	Liquid/Oral	58 (72.50)	66 (82.50)	-13.79
		Injection	22 (27.50)	14 (17.50)	36.36

Control of Ecto-Parasite	Method of diagnosis	Insect observation	25 (31.25)	24 (30.00)	4.00
		Hair falling	6 (7.50)	8 (10.00)	-33.33
		Skin abrasions	31 (38.75)	20 (25.00)	35.48
		Bleeding	10 (12.50)	24 (30.00)	-140.00
		Doctor/VLI	8 (10.00)	4 (5.00)	50.00
	Application	Cleaning	34 (42.50)	56 (70.00)	-64.71
		External applications	31 (38.75)	16 (20.00)	48.39
		Injection	15 (18.75)	8 (10.00)	46.67
First Aid Kit	Basic knowledge and components (Bandage, ointment, tincture, cotton, syringe, painkiller drug, bandage tape)		70 (87.50)	54 (67.50)	22.86
Vaccination	Animals vaccinated (HS, FMD etc.)		65 (81.25)	54 (67.50)	16.92

(Per cent in parenthesis)

From all above discussions it is clear that, the technological changes in healthcare practices of dairy animals over a time was indicated by the extent of adoption of above practices by the respondents over different time period. Extent of adoption of naval cord treatment was increased by antiseptic solution; it may be attributed to increased hygiene and calf management among the farmers. There is a moderate change in extent of

adoption of disbudding by electric bud remover method; the farmers might be well-informed about the advantages of disbudding practice. Further extent of adoption of Control of endo-parasite was moderately increased by increase in method of diagnosis by faeces consistency and increase in the application of injection. In case of control of ecto-parasite, extent of adoption was increased by insect observation, skin abrasions and involvement of doctor/VLI for the diagnosis of ecto-parasites and increase in the external application and injection was observed. With regards to adoption about basic knowledge and components of first aid kit, it was observed that there was a positive change in number of respondents adopting and increasing their knowledge. The extent of animal vaccination of dairy animals was also increased. All the above changes might be due to increased awareness and concern about health of the animals among the farmers, which in turn might be due to increased extension efforts in creating awareness about pest and disease management in dairy animals. In overall extent of adoption of healthcare practices of dairy animals, there was incremental technological change in healthcare practices of dairy animals.

4.4.4 Dairy Management Practices

4.4.4.1 Clean milk production

From the Table-4.18, it is revealed that there was increase in the percent change of respondents for disinfecting the utensils (46.34%), udder/teat cups (41.18), self (38.78%) and house (21.74%). Moreover, it was observed that there was increase in cleaning of utensils, udder, house etc. both times before milking and after milking with percent change of 51.22 per cent of respondents. There was increase in the percent change of adopting spraying type of disinfectant with 47.83 per cent of respondents. It observed that, there was increase in full hand method of milking with per cent change in 16.90 per cent of respondents.

4.4.4.2 Control of mosquito

The data from the Table-4.18, showed that there was increase in the percent change of respondents for control mosquito by the practices of creating smoke of straw & dry grass (32.73%), any external application on body (45.83%) and mosquito net/mosquito trapper/pheromone used (57.45%).

4.4.4.3 Bedding material

The data from the Table-4.18 revealed that there was increase in the percent change of respondents for usage in mat type (63.64%) and soil type (11.32%) bedding materials.

4.4.4.4 Cleaning of cattle shed

A look from the Table-4.18 revealed that there was increase in the percent change of respondents for cleaning of cattle shed was with more than twice in a day with 14.00 per cent involved in it.

4.4.4.5 Milking machine

From the Table-4.18, it is revealed that there was increase in the percent change of respondents for usage of the milking machines with 28.21 per cent.

4.4.4.6 Manure management system

The data analyzed and presented in the Table-4.18, revealed that there was increase in the per cent change of respondents for the usages of manure as composting (33.33%) and biogas (10.00%). It was also observed that for storing to manures there was increase in per cent change of respondents for specified pits usage (8.16%) and heap near cattle shed (25.00%).

4.4.4.7 Extreme weather control

From the Table-4.18, it was revealed that there was increase in the percent change of respondents for the cold weather by covering shed of the dairy animals with 20.00 per cent. Whereas, there was increase in the per cent change of respondents for the hot weather by the provision of fan availability (52.00%) and sprinklers (50.00).

4.4.4.7 Farm records

A cursory look from the Table-4.18, it was revealed that there was increase in the per cent change of respondents for the milking record and birth record information and usage with 15.38 percentage, followed by ear tagging (14.29%) and animal record (13.33%). The overall average increase in the percent change in information and usage of farm records by the respondents was 14.06 per cent.

Table-4.18: Change in selected technologies of dairy management practices

Technology Information	Particulars		2017-18 (n=80)	2012-13 (n=80)	Per cent change
Clean Milk Production	Disinfection	Utensils	41 (51.25)	22 (27.50)	46.34
		Self	49 (61.25)	30 (37.50)	38.78
		Udder/teat cups	17 (21.25)	10 (12.50)	41.18
		House	23 (28.75)	18 (22.50)	21.74
	Cleaned	Before milking	30 (37.50)	54 (67.50)	-80.00
		After milking	9 (11.25)	6 (7.50)	33.33
		Both time	41 (51.25)	20 (25.00)	51.22
	Type of disinfectant	Washing	57 (88.75)	68 (85.00)	-19.30
		Spraying	23 (28.75)	12 (15.00)	47.83
	Type of milking	Full hand method	71 (88.75)	59 (73.75)	-16.90
		Knuckling	29 (36.25)	41 (51.25)	-41.38
Control of Mosquito	Create smoke of straw and dry grass		55 (68.75)	37 (46.25)	32.73
	Any external application on body		48 (60.00)	26 (32.50)	45.83
	Mosquito net/Mosquito trapper/Pheromone used		47 (58.75)	20 (25.00)	57.45
Bedding Material	Temporary/ Permanent	Soil bedding	53 (66.25)	47 (58.75)	11.32
		Rice straw/husk bedding	16 (20.00)	29 (36.25)	-81.25
		Mat bedding	11 (13.75)	4 (5.00)	63.64

Cleaning of Cattle Shed	Cleaning time	Once in a day	19 (23.75)	26 (32.50)	-36.84
		Twice in a day	11 (13.75)	10 (12.50)	9.09
		More than twice in a day	50 (62.50)	43 (53.75)	14.00
Milking Machines	Usage		39 (48.75)	28 (35.00)	28.21
Manure Management System	Used as	Dung cake	58 (72.50)	63 (78.75)	-8.62
		Composting	12 (15.00)	8 (10.00)	33.33
		Biogas	10 (12.50)	9 (11.25)	10.00
	Stockpiling /Manure storage	Specified Pits	49 (61.25)	45 (56.25)	8.16
		Direct in fields	23 (28.75)	29 (36.25)	-26.09
		Heap near cattle shed	8 (10.00)	6 (7.50)	25.00
Extreme Weather Control	Cold weather	Heating surrounding by burning	17 (21.25)	21 (26.25)	-23.35
		Covering shed	45 (56.25)	36 (45.00)	20.00
		No control measures	18 (22.50)	23 (28.75)	-27.78
	Hot weather	Sprinkling water	14 (17.50)	7 (8.75)	50.00
		Fan availability	50 (62.50)	24 (30.00)	52.00
		Fan and Sprinklers	42 (52.50)	33 (41.25)	21.43

Farm Records (14.60)	Animal record	15 (18.75)	13 (16.25)	13.33
	Ear tagging	14 (17.50)	12 (15.00)	14.29
	Milking record	13 (16.25)	11 (13.75)	15.38
	Birth record	13 (16.25)	11 (13.75)	15.38

(Per cent in parenthesis)

From all the above discussions it is clear that, the technological changes in dairy management practices of dairy animals over a time was indicated by the extent of adoption of above practices by the respondents over different time period. The extent of adoption of clean milk production practices were moderately increased, it was observed there was extent of increase in respondents in disinfection of the utensils, udder/teat cups, house and self disinfection. It was also revealed that there was increase in respondents cleaning both the time in morning and evening with the increase in spraying type of disinfectant by the respondents. There was increase in the respondents in type of milking by full hand method. This change might be due to increased demand for cleanliness and hygiene among the milk consumers and also the dairy farmers concern for consumers by following scientific dairy farming. It was observed that there was increase in the usage of mosquito net/mosquito trapper/pheromones for control of mosquitoes by the respondents with increase in mat type of bedding materials usage for dairy animals by the respondents. There was increase in more than twice cleaning of cattle shed in a day by the respondents with increase in usage of manure as composting and storing it as heap near cattle shed. In the control extreme weather conditions for cold weather, there was increase in usage of covering of shed and for hot weather, there was increase in the provision of fan availability. Further, it was revealed that there was increase in the storage of the farm records by the respondents; it might be due to lack of knowledge in accounts and record keeping, and illiteracy among the farmers. In overall technological adoption of management practices of dairy it can be inferred from above discussion that there is an incremental technological change in management practices of dairy animals. This technological change can be attributed to increase in availability of knowledge on dairy farming practices by different actors of dairy innovation platform.

4.4.2 Change in housing systems

The data in the Table-4.19 represents type of animal shed and feeding manger used by dairy farmers over a five year time. During 2017-18, 6.25 per cent of respondents used hut without wall compared to 18.75 per cent in the year 2012-13 resulting in decrease by 200 per cent change in percent. The kuccha animal sheds and feeding manger usage was reduced to 8.75 per cent respondents in the year 2017-18, when compared to 41.25 per cent with percent change decrease to 157.14 per cent. Whereas pucca thatched sheds was concerned to 30.00 per cent of respondents in the year 2017-18 as compared to 22.50 per cent of respondents in 2012-13 with an increase in percent change with 25 per cent. In case of pucca with concrete roof sheds 55.00 per cent respondents used them in the year 2017-18, while it was observed that 36.25 per cent of respondents used them in 2012-13 with an increase per cent change with 34.09 per cent. From the above data it is clear that there was increased use of pucca with concrete roof shed and Pucca/thatched/asbestos over a period of five years and further decline in Kuccha thatched/tiled/asbestos and hut without wall of cattle sheds and feeding manger. And the use of all other type of shed saw a decline in their use over a period. All the above changes might be attributes to the financial status of the farmers and also the heard size and requirements.

Table-4.19: Housing systems of dairy animals

Cattle shed & Feeding Manger	2017-18 (n=80)	2012-13 (n=80)	Per cent change
Hut without wall	5 (6.25)	15 (18.75)	-200.00
Kuccha thatched/tiled/asbestos	7 (8.75)	33 (41.25)	-157.14
Pucca/thatched/asbestos	24 (30.00)	18 (22.50)	25.00
Pucca with concrete roof	44 (55.00)	29 (36.25)	34.09

(Per cent in parenthesis)

4.4.3 Status of calf mortality and animal morbidity

4.4.3.1 Incidence of calf mortality (during last five years)

Calf mortality is a serious issue in management practices of dairy animals. Reducing calf mortality is one of the aims of our advance and new technologies in dairying. Here from the Table-4.20, it can be understood that in the last five years more

mortality was observed in Buffalo (27.52%) when compared to Indigenous cow (27.52%) and Crossbred cow (14.88%). Might be increased knowledge and experience of the farmers in dairying helped them to manage well their new born calf and as a consequence mortality has reduced.

Table-4.20: Incidence of calf mortality (during last five year)

Indigenous Cow	CB cow	Buffalo
37 (21.26%)	32 (14.88%)	30 (27.52%)

(Per cent in parenthesis)

4.4.3.2 Incidence of morbidity (during last five years)

Animal morbidity is one of important aspect focussed by every government for vaccination of the animals on timely basis. The Table 4.21 is showing that maximum morbidity was observed due to parasites infestation (63.45%) followed by was due to injuries (54.82%) because of more pucca concrete floors were observed. It was observed that because of less cleanliness maintained in the cattle shed and feeding manger due to involvement in other service activities, the morbidity was at quite high even due to mastitis (54.42%) and poisoning (54.42%).

Table-4.21: Incidence of morbidity (during last five years)

Disease/ Disorders	Affected animals
FMD	89 (17.87)
HS	55 (11.04)
Mastitis	271 (54.42)
Anoestrus	232 (46.59)
Repeat breeding	252 (50.60)
Parasites infestation	316 (63.45)
Injuries	273 (54.82)
Abortion	45 (9.04)
Milk fever	50 (10.04)
Poisoning	9 (1.81)
Bloats	57 (11.45)

(Per cent in parenthesis)

4.4.4 Productive and Reproductive parameters of dairy animals

Productive and reproductive parameters are indispensable to the growth of dairy animals as profitability of dairying has direct relation with the performance productive as well as reproductive performance of animals (Meena *et al*., 2015). Proper management of the dairy animals helps in improvement of the health of animals and development of productive as well as reproductive parameters. Age at first calving (in months) is one of the important reproductive parameter of the animal; here in the study area from Table-4.22, it was revealed that in case of Indigenous cow it was 44±2.65 while in crossbreed cow 33±3.53 and buffalo 42±2.91. Service period has been 148±15 days, 136±17 days and 121±19 days in the case of buffalo, crossbred cow and indigenous cattle respectively. If we talk about peak yield, this is one of the important parameter among all other. Peak yield is one of the parameter which helps in economic perspective also. In case of cross breed (25±6 litre) and buffalo (19±5 litre) the peak yield was more compare to indigenous cow (11±3 litre), even Singh *et al*., (201), reported that descriptive breed of buffaloes were having peak yield 10.50±0.3 kg). It has found that dry period dairy animals have been 72±13 days, 52±12 days and 84±15 days in indigenous cows, crossbreed cows and buffalo respectively. While calving interval of dairy animals have been 396±14 days, 411±21 days and 453±22 days in indigenous cows, crossbreed cows and buffalo respectively. May be with effective extension service and proper management of the dairy animals this kind of improvement was possible. Anyway, there are improved technologies available which can improve productive and reproductive parameters of the dairy animal, as Meena *et al.*, (2017), reported that impact of technologies on such parameters as dry periods, calving interval, age at first calving were possible to decrease.

Table-4.22: Productive and Reproductive parameters of dairy animals

Parameters	Indigenous cow	Cross breed cow	Buffalo
Age at first calving (month)	44±2.65	33±3.53	42±2.91
Service period (days)	121±19	136±17	148±15
Peak yield (lit.)	11±3	25±6	19±5
Dry period (days)	72±13	52±12	84±15
Calving interval (days)	396±14	411± 21	453±22

(Mean ± S.E)

CHAPTER –5

Summary and Conclusions

5. SUMMARY AND CONCLUSIONS

India is the second largest populous country of the world having 2.4 percent of global geographical area and the economy of Indian is agriculture oriented and nearly three-fourth populations depend on agriculture, livestock and allied sectors for their livelihood. This is the mainstay for ensuring food and nutritional security, sustainable development and for alleviation of poverty through generation of employment opportunities.

During the twenty first century, agriculture sector is witnessing radical changes and challenges at national as well as global level. It is estimated that by 2050 the global urban population could reach around 6.3 million, which reaches to a share of 3.5 billion urban dwellers worldwide in 2010 (UNHABITAT, 2012). The demand for agricultural commodities and animal food products in India is also abruptly rising owing to population increase; urbanization; sustained rise in per capita income, food preferences of the next-generation consumers. The emerging challenges of Indian agriculture are limited land and water availability, which is further exacerbated by degradation of natural resources; climate changes; changes in demand and consumption patterns, moving toward high-value agricultural technologies that enable adequate employment and income generation, especially from small and marginal farmers who constitute more than 80 percent of the farming community in the country. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). Livestock plays an important role in Indian economy. It was estimated that about 20.5 million people depend upon livestock for their livelihood. Livestock provides livelihood to two-third of rural community. India has vast livestock resources.

Considering the rapid increase in the human population of our country, achieving minimum per capita level is real challenge. Not only we have to increase our milk production in near future, but also we have to concentrate our efforts on improving the quality of milk and production system with better management. Access to information is a constraint for many actors in the dairy subsector, and uncertainty exists regarding the quality and reliability of the information that is available. Actors in the dairy value chain such as farmers and traders lack awareness of where and how to access information. Further, in instances that they are aware of information sources, they are faced with the

inability to access those sources principally because extension workers and research institutions have limited resources or opportunities for passing on information. The private sector, especially those involved in supplying feeds and drugs have continuously given inconsistent information on their products to farmers and input traders. However, farmers have no capacity to judge the accuracy of this information in addition to having minimal regulation of the quality of this information often enforced through advertising standards.

Innovation platforms bringing together dairy stakeholders harbour the potential to improve accountability and quality of information, to benefit farmers and consumers. An innovation platform is a space for learning and change. It is a group of individuals (who often represent organizations) with different backgrounds and interests: farmers, traders, food processors, researchers, government officials, etc. The members come together to diagnose problems, identify opportunities and find way to achieve their goals. They may design and implement activities as a platform, or coordinate activities by individual members (CGIAR, 2013). Access to information is a constraint for many actors in the dairy subsector, and uncertainty exists regarding the quality and reliability of the information that is available. This study therefore, intends to assess how much the structure of innovation platforms disseminate information to farmers and shares information between the actors, influences utilization of information sources with their credibility and its influence on the performance of the dairy farmers especially in assessing the biophysical change in scientific dairy farming due to Innovation platform with study entitled as **"Dynamic of Dairy Innovation Platform in Haryana"** was carried out with following objectives:

1. To study the dynamic of actors involved in scientific dairy farming in the study area
2. To find out the utilization of dairy innovation platform by the respondents
3. To assess the biophysical change in scientific dairy farming due to Innovation Platform

5.1 RESEARCH METHODOLOGY

The Haryana state is divided under different regions which comprises of 22 districts divided into two agro regions viz. Eastern region and Western region. Both the two regions will be purposively selected for the study to represent the entire state.

Purposively One district each will be selected from Eastern region and Western region. Thus a total of two districts will be selected based upon simple random sampling technique and highest bovine population. From each district two blocks will be selected randomly. From each block four villages will be selected randomly thus, a total of 8 villages on proportionate random sampling technique are selected. Than each category farmers were selected by applying proportionate stratified random sampling technique in such a way that total respondents will be 10 from each village and 10 each researchers, extension personnel and input suppliers were selected from each district. Thus, total respondents of 140 for study. The primary data was collected from the respondents using PRA tools and personal interview schedule. The collected data was scored, compiled, tabulated and analyzed using appropriate statistical tools to draw rational and meaningful conclusions.

5.2 Salient Findings

5.2.1 Profile of farmers and actors of Dairy Innovation Platform

1. Most of the farmers (50.00%) belonged to middle age group (36 to 50 years), majority were literate up to middle level (33.75%) with majority having low (up to 13 years) & medium level (13 to 23 years) of experience in dairy farming with 36.25 per cent and 38.75 per cent. The majorities were having low category in net annual income of Rs. 2.3 lakh to 3.5 lakh with 46.25 per cent, more than 60 per cent of income was from dairying. Average herd size was 6.23, out of which 36.00 per cent was occupied by crossbreed cattle and average milk production was 46.06 lit/day/household.

2. Majority of the researchers belonged to old age group (>50 years) with 50.00 per cent, while extension personnel and input suppliers were in middle age group (36-50 years) with 55.00 per cent and 65.00 per cent respectively. The literacy level of researchers, extension personnels and input suppliers were majority up to Doctorate (100.00%), Graduation (55.00%) and middle school level (35.00%) respectively. The experience in their respective fields were high (>25 years) with 45.00 per cent, medium (18-23 years) with 45.00 per cent and low (up to 17 years) with 65.00 per cent.

5.2.2 Analyzing the knowledge information flow among dynamic of actors involved in scientific dairying

1. It showed that for the dissemination of dairy information the researchers disseminated maximum information in animal feeding practices (73.33%), extension personnel disseminated maximum information in animal breeding practices (82.00%), input suppliers disseminated maximum information in animal breeding practices (78.00%). In overall the maximum dairy information disseminated by the actors was on animal breeding practices (76.22%).

2. The was observed that for the sharing of dairy information the researchers (27.87%) shared maximum information on animal breeding practices, input suppliers (25.53%) shared maximum information on animal feeding practices, extension personnel (27.58%) shared maximum information on animal healthcare practices. It was also observed that extension personnel (26.25%) shared maximum information on dairy management practices. In overall, it can be inferred that the dairy information shared by the actors from dairy innovation platform was maximum from extension personnel.

5.2.3 Utilization of information sources and their credibility

1. It was revealed that information source by farmers on dairy farming was maximum from progressive farmers with 76.67 per cent utilization & 75.58 per cent credibility, while KVK with good credibility (61.42%) was utilized lowest (43.00%). This might be due to the fact that farmers believing in practical experience of progressive farmers and their availability in the proximity of the study area. Further it showed that VO with 72.33 per cent utilization having 68.25 per cent credibility, drug vendors with 72.08 per cent utilization having 69.50 per cent credibility, dairy cooperatives & milk plant with 65.25 per cent utilization having 56.08 per cent credibility, feed & dairy equipments suppliers with 64.75 per cent utilization having good credibility of 71.08 per cent, SMS with 61.08 per cent utilization having 57.67 per cent credibility and NGO with 57.00 per cent of utilization having 62.08 per cent credibility.

2. It showed that among the actors significantly higher credibility was recorded on input suppliers ($77.61^{c}\pm1.45$) over extension personnel ($74.75^{b}\pm1.37$) and

researchers (72.26^{a}±1.39).In multiple comparisons, means with same superscript indicated non-significant differentiation in terms of credibility of information provided by the different actors.

3. It was observed that the credibility of actors as told by the actors of dairy innovation platform on "Resource person are more credible in providing information required by actors of dairy innovation platform" was maximum from researcher (80.00%). Further it revealed that the credibility of actors on "Scientists and veterinary officers are more credible to the farmers" was maximum from researcher (89.00%). The credibility of actors on "Dairy farmers most often use the information from fellow farmers as they are most credible" was maximum from input suppliers (81.00%) followed. The credibility of actors on "Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information" was same from both extension personnel (91.00%) and input suppliers (91.00%). The credibility of actors on "Non-local communication channels involve the highest search costs to get the needed information" was maximum from researcher (52.00%). The credibility of actors on "The use of local channels is declining over a period" was maximum from researcher (56.00%). The credibility of actors on "Increasing literacy rate results in increased utilization by the farmers" was maximum from input suppliers (71.00%). Among all the seven statements of scale the maximum credibility of actors was 90.33 per cent on "Farmers prefers Dairy Mela/Pasu palan mela (PPM) for source of information".

5.2.4 Change in scientific dairy farming over a period of five years

5.2.4.1 Animal Breeding

In the method of heat detection, the increase in percent change of 24.59 per cent of respondents in bellowing, restless, mounting on animals, frequent urination and vaginal discharge were observed. Moreover, it was observed that breeding of dairy animals was mostly done by Artificial Insemination (AI) method by increase in self involvement of dairy farmers with percent change of 80.65 per cent of respondents. In case of number of service per conception it was observed that there was decrease from 4 to 3 with percent change in 83.33 per cent of respondents. It was also observed that there was increase in frequency of insemination for 2 with a percent change of 36.00 per cent of respondents.

5.2.4.2 Animal feeding

It was observed that the extent of average quantity of concentrate feeding was decreased with 3.23 per cent. Further, even the number of concentrates was also decreased from three times with 36.36 per cent of respondents. The composition of concentrates fed to milking animals/day was having moderate change, moreover there was increase in purchase and involvement of pellets in feeding as per the recommendations. With respect to green fodder and dry fodder, the average quantity was increased with 30.00 per cent and 16.67 per cent respectively to get improved milk yield. With regards to extent of adoption of feed supplements, it was a positive change in Ca with 33.33 per cent of respondents involvement. In overall extent of adoption of feeding practices of dairy animals, it is clear that there is an incremental technological change in feeding practices of dairy animals.

5.2.4.3 Animal healthcare

It was observed that the extent of adoption of naval cord treatment was increased by antiseptic solution with change in 25.37 per cent of respondents. There is a moderate change in extent of adoption of disbudding by electric bud remover method with change in 27.66 per cent of respondents. Further, the extent of adoption of control of endo-parasite was moderately increased by increase in method of diagnosis by faeces consistency and increase in the application of injection with change in 13.64 per cent and 36.36 per cent of the respondents. In case of control of ecto-parasite, extent of adoption was increased by involvement of doctor/VLI for the diagnosis of ecto-parasites with change in 50.00 per cent of the respondents and increase in the external application was observed with change in 48.39 per cent of the respondents. With regards to adoption about basic knowledge and components of first aid kit, it was observed that there was a positive change in number of respondents with 22.86 per cent for adopting and increasing their knowledge. The extent of animal vaccination of dairy animals was also increased by 16.92 per cent of the respondents. There was incremental technological change in overall extent of adoption of healthcare practices of dairy animals.

5.2.4.4 Dairy management practices

It was observed that in clean milk production practices there was extent of increase in respondents in disinfection of the utensils wit change in 46.34 per cent of the respondents. It was also revealed that there was increase in respondents cleaning both the

time in before and after milking with the increase in spraying type of disinfectant by the respondents with change in 47.83 per cent of the respondents. There was increase in the respondents in type of milking by full hand method with change of 16.90 per cent of respondents involvement. It was observed that there was change in increase in the usage of mosquito net/mosquito trapper/pheromones for control of mosquitoes by the respondents (57.45%) with increase in mat type of bedding materials usage for dairy animals by the respondents (63.64%). There was change in increase in more than twice cleaning of cattle shed in a day by the respondents (14.00%) with increase in usage of manure as composting by the change in respondents (33.33%) and storing it as heap near cattle shed by change in 25.00 per cent of the respondents. In the control of extreme weather conditions for cold weather, there was increase in usage of covering of shed by change in 20.00 per cent of respondents and for hot weather, there was increase in the provision of fan availability by change in 52.00 per cent of respondents. Further, it was revealed that there was increase in the storage of the farm records by the respondents with change in 14.60 per cent of the respondents. There was incremental technological change in overall extent of adoption of management practices of dairy animals.

5.2.4.5 Housing system

It was revealed that in case of pucca with concrete roof sheds 55.00 per cent respondents used them in the year 2017-18, while it was observed that 36.25 per cent of respondents used them in 2012-13 with an increase percent change with 34.09 per cent and the use of all other type of shed saw a decline in their use over a period.

5.2.4.6 Status of calf mortality and animal morbidity

It was observed that in the last five years more calf mortality was observed in Buffalo (27.52%) when compared to Indigenous cow (27.52%) and Crossbred cow (14.88%). Further it was also revealed that maximum morbidity was observed due to parasites infestation (63.45%) followed by was due to injuries (54.82%).

5.2.4.7 Productive and Reproductive parameters of dairy animals

It was revealed that the Age at first calving (in months) in case of Indigenous cow was 44±2.65 while in crossbreed cow 33±3.53 and buffalo 42±2.91. Service period has been 148±15 days, 136±17 days and 121±19 days in the case of buffalo, crossbred cow and indigenous cattle respectively. If we talk about peak yield, in case of cross breed (25±6 litre) and buffalo (19±5 litre) the peak yield was more compare to indigenous cow

(11±3 litre). It has found that dry period dairy animals have been 72±13 days, 52±12 days and 84±15 days in indigenous cows, crossbreed cows and buffalo respectively. While calving interval of dairy animals have been 396±14 days, 411± 21 days and 453±22 days in indigenous cows, crossbreed cows and buffalo respectively.

5.3 CONCLUSIONS

Based on the findings of the present investigation and conclusion made there upon following implications could be recommended:

1. Most of the farmers were found to be in middle aged group with good middle level education status and good experience in dairy farming but low net annual income, medium level of family education status, herd size, cropping intensity, land holding, milk production, milk consumption and milk sale.
2. Majority of the researchers belonged to old age group, while extension personnel and input suppliers were in middle age group. The literacy level of researchers, extension personnel and input suppliers were majority up to doctorate, graduation and middle school level respectively with experience in their respective fields having high, medium and low.
3. Most of the dairy information disseminated by researchers on animal feeding practices, extension personnel on animal breeding practices, input suppliers on animal breeding practices. In overall the maximum dairy information disseminated by the actors was on animal breeding practices.
4. Most of the dairy information was shared by researchers on animal breeding practices, input suppliers on animal feeding practices, extension personnel on animal healthcare practices. It was also observed that extension personnel shared maximum information on dairy management practices. In overall, it can be inferred that the dairy information shared by the actors from dairy innovation platform was maximum by extension personnel.
5. Majority of farmers utilized information source on dairy farming was from progressive farmers with high credibility, while KVK with good credibility was utilized lowest.
6. It showed that among the actors significantly higher credibility was recorded on input suppliers over extension personnel and researchers. In multiple comparisons,

there was non-significant differentiation in terms of credibility of information provided by the different actors.

7. There was incremental change in the technology of scientific dairy farming practices over a period of five years from 2012-13 to 2017-18.

5.4 IMPLICATION OF THE STUDY

1. Need to improve involvement of extension personnel on advisory services in disseminating dairy information for farmers.
2. Extension personnel should increase their sharing of information in breeding and feeding practices to other actors as they are more involved at the field level activities.
3. KVK and NGO can be utilized more by farmers as they have more credibility on dairy farming practices.
4. Dairy farming practices improvement can be better focused by giving training to input suppliers as they have good credibility among actors and farmers in dairy innovation platform.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

Based on the findings and experiences of the present study, following areas were identified where further research could be contemplated.

1. The similar study can be conducted in other areas of the country with inclusion of performance of actors in dairy innovation platform.
2. The present study was restricted to rural areas only so it can be conducted again in other areas (peri-urban/urban) also.
3. A research project could be formulated for analyzing the extent of participation of farmers in dairy innovation platforms like; dairy melas, krishi melas, kishan ghosti, trainings in KVK/research institutes etc.

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Appendices

Dynamic of Dairy Innovation Platform in Haryana

Respondent - Farmers

PART- I

Res. No	Region	District	Block	Village	Date

1. Family Profile

Sl. No	Name of Member	Relationship with Respondent	Age (Years)	Sex	Education
1					
2					
3					
4					

2. Operational land holding (in acres): _____

3. Occupation

Sl. No.	Particulars	Income (Rs.)
i.	Agriculture	
ii.	Dairy	
iii.	Labour	
iv.	Business	
V.	Service	

4. Herd Size

Sl. No.	Type of animal	In milk	Dry	Heifer	Young stock	Male	Total
1	Indigenous cows						
2	Crossbreed cows						
3	Buffaloes						

5. Milk production, Consumption and Sale (One day prior to investigation)

Sl. No.	Type of animal	Production (l/day)	Consumption (l/day)	Sold (l/day)
1	Indigenous cow			
2	Crossbreed cow			
3	Buffalo			

6. Land utilization and cropping intensity

Sl. No.	Crops	Area (ha)	Yield (q/ha)
A	Kharif		
1	Paddy		
2	Cotton		
3	Sorghum		
4	Maize		
5	Any other		
B	Rabi		
1	Wheat		
2	Barley		
3	Berseem		
4	Oats		
5	Vegetables		
6	Any other		
C	Summer		
1	Sorghum		
2	Maize		
3	Bajra		
4	Vegetables		

PART- II

7. Information source utilization and credibility (Concerned Dairy farming practices)

Particulars	Frequency of contact			Credibility		
	Frequently	Sometimes	Rarely	Most credible	Credible	Least Credible
Animal Breeding						
SMS						
Veterinary Officer (VO)						
KVK staff						
Dairy cooperative organisation & milk plant						
NGO staff						
Feed and dairy equipment suppliers						
Drug vendors						
Progressive farmers						
Animal Feeding						
SMS						
Veterinary Officer (VO)						
KVK staff						
Dairy cooperative organisation & milk plant						
NGO staff						
Feed and dairy equipment suppliers						
Drug vendors						

Progressive Farmers						
Animal Healthcare						
SMS						
Veterinary Officer (VO)						
KVK staff						
Dairy cooperative organisation & milk plant						
NGO staff						
Feed and dairy equipment suppliers						
Drug vendors						
Progressive Farmers						
Dairy Management Practices						
SMS						
Veterinary Officer (VO)						
KVK staff						
Dairy cooperative organisation & milk plant						
NGO staff						
Feed and dairy equipment suppliers						
Drug vendors						
Progressive Farmers						

8. Change in Scientific dairy farming (memory recall technique)

8.1 Change in Animal Breeding

Technology Information	Particulars		2017-18	2012-13
Heat detection & Insemination	Method of heat detection	Bellowing, Restless and Mounting on animals		
		Bellowing, Restless, Mounting on animals, Frequent urination, Vaginal Discharge		
	Person	Self involved		
		Doctor/VLI		
	Number of services/ conception	3		
		4		
	Frequency of insemination	1		
		2		
		More than 2		
Pregnancy Diagnosis	Sign of pregnancy	Self Observation		
		Pregnancy Diagnosis by Veterinarian, *Paravet*, VLDA		
Breed Improvement	Breeding	Selective/Cross breeding		
		Upgradation		
	Type of breed	Indigenous breed		
		Cross breed		
	Germplasm collection	Self involvement		
		Animals from institutes/firms		
		Cooperatives/farmers		

8.2 Change in Animal Feeding

Technology Information	Particulars		2017-18	2012-13
Concentrate Feeding	Quantity	kg/milchanimal		
	No. of feeding	2		
		3		
Composition of Concentrates	Concentrate preparation	Self preparation + Purchased		
		Self preparation		
		Purchased		
	Cakes/ Pellets	Cakes		
		Pellets		
Green Fodder	Quantity	kg/animal		
Dry Fodder	Quantity	kg/animal		
Feed Supplements		Ca		
		Common Salt		
		Mineral Mixture		

8.3 Change in Animal Healthcare

Technology Information	Particulars		2017-18	2012-13
Naval cord treatment	Application of Aseptic (ointment/s)	Local resource		
		Antiseptic solution		
Disbudding	Methods of disbudding	Electrical bud remover		
		Hot iron rod burning		
		Caustic method		
	Healing time	Days		
Control of Endo Parasite	Method of diagnosis	Faeces consistency		
		Doctor/VLI		
	Application	Liquid/Oral		
		Injection		
Control of Ecto Parasite	Method of diagnosis	Insect observation		
		Hair falling		
		Skin abrasions		
		Bleeding		
		Doctor/VLI		
	Application	Cleaning		
		External applications		
		Injection		
First Aid Kit	Basic knowledge and components (Bandage, ointment, tincture, cotton, syringe, painkiller drug, bandage tape)			
Vaccination	Animals vaccinated (HS, FMD etc.)			

8.4 Change in Dairy Management Practices

Technology Information	Particulars		2017-18	2012-13
Clean Milk Production	Disinfection	Utensils		
		Self		
		Udder/teat cups		
		House		
	Cleaned	Before milking		
		After milking		
		Both time		
	Type of disinfectant	Washing		
		Spraying		
	Type of milking	Full hand method		
		Knuckling		
Control of Mosquito	Create smoke of straw and dry grass			
	Any external application on body			
	Mosquito net/Mosquito trapper/Pheromone used			
Bedding Material	Temporary/ Permanent	Soil bedding		
		Rice straw/husk bedding		
		Mat bedding		
Cleaning of Cattle Shed	Cleaning time	Once in a day		
		Twice in a day		
		More than twice in a day		

Milking Machines	Usage			
Manure Management System	Used as	Dung cake		
		Composting		
		Biogas		
	Stockpiling /Manure storage	Specified Pits		
		Direct in fields		
		Heap near cattle shed		
Extreme Weather Control	Cold weather	Heating surrounding by burning		
		Covering shed		
		No control measures		
	Hot weather	Sprinkling water		
		Fan availability		
		Fan and Sprinklers		
Farm Records	Animal record			
	Ear tagging			
	Milking record			
	Birth record			

8.5 Housing systems

Sl. No.	Cattle Shed & Feeding Manger	2017-18	2012-13
A	Hut without wall		
B	Kuccha thatched/tiled/asbestos		
C	Pucca/thatched/asbestos		
D	Pucca with concrete roof		
E	No shed		

8.6 Status of calf mortality and animal morbidity

Incidence of calf mortality: (during last five years)

Indigenous Cow	CB cow	Buffalo

Incidence of morbidity: (during last five years)

Disease/ Disorders	Affected animals
FMDs	
HS	
Mastitis	
Anoestrus	
Repeat breeding	
Parasites	
Accidental	
Abortion	
Milk fever	
Poisoning	
Bloats	
Any other	

8.7 Productive and Reproductive parameters of dairy animals

Parameters	Indigenous cow	Crossbred cow	Buffalo
Age at first calving (month)			
Service period (days)			
Peak yield (lit.)			
Dry period (days)			
Calving interval (days)			

9. Innovation Platform

Particulars		1 = No contribution, 2 = Less contribution, 3 = Moderate contribution, 4 = High contribution,5 = Very high contribution			
		Researcher	Extension personnel	Input supplier	Farmer
Breeding	Proper time of insemination				
	Service period				
	Pregnancy diagnosis				
	Breed improvement				
	Others				
Feeding	Concentrate feeding				
	Composition of concentrates				
	Fodder seeds				
	Silage				
	Mineral mixture				
	Colostrums feeding				
	Quantity and type of green fodder				
	Feed supplements				
	Others				

Health care	Naval cord				
	Disbudding				
	Control of endo & ecto parasite				
	First aid kit				
	Vaccination				
	Prolyse management				
	Treatment of anoestrus and repeat breeding				
	Mastitis control				
	Abortion control				
	Others				
Management	Clean milk production				
	Control of mosquito, ticks etc.				
	Bedding material				
	Cleaning of cattle shed				
	Milking machines				
	Manure management system				
	Farm records				
	Extreme weather control				
	Others				

Respondents - Researcher

PART- I

Region	District	Block	Village	Date

1. Name: _____

2. Age (Years): _____

3. Professional Qualification: _____

4. Institution (Place of work):_____

5. Year of experience: _____

6. Area of specialization:

Major area	Minor area
Animal Breeding	
Animal Feeding	
Animal Health Care	
Dairy Management Practices	
Other advisory services	

PART- II

7. Source of Information (Concerned Dairy farming practices) to farmers

Particulars		Frequently	Sometimes	Rarely
Animal Breeding				
Proper time of insemination				
Service period				
Pregnancy diagnosis				
Breed improvement	Selective/Cross breeding			
	Upgradation			
Others				
Animal Feeding				
Concentrate feeding				
Composition of concentrates				
Fodder				
Silage				
Mineral Mixture				
Colostrum feeding				
Quantity and type of green fodder				
Feed supplements				
Others				
Animal Health Care				
Naval cord				
Disbudding(within 1 month)				
Control of Endo parasite				
Disease/ Disorders treatment				
Control of Ecto parasite				
First aid kit				

Vaccination			
Prolapse management			
Treatment of anoestrus and repeat breeding			
Mastitis control			
Abortion control			
Others			
Dairy Management Practices			
Clean milk production			
Housing system			
Control of mosquito, ticks etc.			
Bedding material			
Cleaning of cattle shed			
Milking machines			
Manure management system			
Farm records			
Extreme weather control			
Others			
Advisory Services			
How to start dairy			
Training			
Marketing			
Linkage creation			
Meetings/ Kisan mandal/ Kisan ghosti			
Demonstrations			
Field trip/field day			
Others			

8 Innovation Platform

Particulars		1 = No contribution, 2 = Less contribution, 3 = Moderate contribution, 4 = High contribution,5 = Very high contribution			
		Researcher	Extension personnel	Input supplier	Farmer
Breeding	Proper time of insemination				
	Service period				
	Pregnancy diagnosis				
	Breed improvement				
	Others				
Feeding	Concentrate feeding				
	Composition of concentrates				
	Fodder seeds				
	Silage				
	Mineral mixture				
	Colostrums feeding				
	Quantity and type of green fodder				
	Feed supplements				
	Others				

Health care	Naval cord				
	Disbudding				
	Control of endo & ecto parasite				
	First aid kit				
	Vaccination				
	Prolyse management				
	Treatment of anoestrus and repeat breeding				
	Mastitis control				
	Abortion control				
	Others				
Management	Clean milk production				
	Control of mosquito, ticks etc.				
	Bedding material				
	Cleaning of cattle shed				
	Milking machines				
	Manure management system				
	Farm records				
	Extreme weather control				
	Others				

9. Credibility of actors in Dairy Innovation platform

Sl. No.	Statements	MC	C	Can't say	LC	NC
1	Resource person are more credible in providing information required by actors of dairy innovation platform (3.53)					
2	Scientists and veterinary officers are more credible to the farmers (3.68)					
3	Dairy farmers most often use the information from fellow farmers as they are most credible (3.44)					
4	Farmers prefers Dairy Mela/Pasu palan mela(PPM) for source of information (3.43)					
5	Non-local communication channels involves the highest search costs to get the needed information (1.77)					
6	The use of local channels is declining over a period (2.04)					
7	Increasing literacy rate results in increased utilization by the farmers (2.66)					

Note :- MC-Most credible, C- Credible, LC- Least Credible, NC- Not Credible

Respondent - Extension Personnel

PART- I

Region	District	Block	Village	Date

1. Name: _____

2. Age (Years): _____

3. Professional Qualification: _____

4. Institution (Place of work): _____

5. Year of experience: _____

6. Area of specialization:

Major area	Minor area
Animal Breeding	
Animal Feeding	
Animal Health Care	
Dairy Management Practices	
Other advisory services	

PART- II

7. Source of Information (Concerned Dairy farming practices) to farmers

Particulars		Frequently	Sometimes	Rarely
Animal Breeding				
Proper time of insemination				
Service period				
Pregnancy diagnosis				
Breed improvement	Selective/Cross breeding			
	Upgradation			
Others				
Animal Feeding				
Concentrate feeding				
Composition of concentrates				
Fodder				
Silage				
Mineral Mixture				
Colostrum feeding				
Quantity and type of green fodder				
Feed supplements				
Others				
Animal Health Care				
Naval cord				
Disbudding(within 1 month)				
Control of Endo parasite				
Disease/ Disorders treatment				
Control of Ecto parasite				
First aid kit				

Vaccination			
Prolapse management			
Treatment of anoestrus and repeat breeding			
Mastitis control			
Abortion control			
Others			
Dairy Management Practices			
Clean milk production			
Housing system			
Control of mosquito, ticks etc.			
Bedding material			
Cleaning of cattle shed			
Milking machines			
Manure management system			
Farm records			
Extreme weather control			
Others			
Advisory Services			
How to start dairy			
Training			
Marketing			
Linkage creation			
Meetings/ Kisan mandal/ Kisan ghosti			
Demonstrations			
Field trip/field day			
Others			

8 Innovation Platform

Particulars		1 = No contribution, 2 = Less contribution, 3 = Moderate contribution, 4 = High contribution,5 = Very high contribution			
		Researcher	Extension personnel	Input supplier	Farmer
Breeding	Proper time of insemination				
	Service period				
	Pregnancy diagnosis				
	Breed improvement				
	Others				
Feeding	Concentrate feeding				
	Composition of concentrates				
	Fodder seeds				
	Silage				
	Mineral mixture				
	Colostrums feeding				
	Quantity and type of green fodder				
	Feed supplements				
	Others				

Health care	Naval cord				
	Disbudding				
	Control of endo & ecto parasite				
	First aid kit				
	Vaccination				
	Prolyse management				
	Treatment of anoestrus and repeat breeding				
	Mastitis control				
	Abortion control				
	Others				
Management	Clean milk production				
	Control of mosquito, ticks etc.				
	Bedding material				
	Cleaning of cattle shed				
	Milking machines				
	Manure management system				
	Farm records				
	Extreme weather control				
	Others				

9. Credibility of actors in Dairy Innovation platform

Sl. No.	Statements	MC	C	Can't say	LC	NC
1	Resource person are more credible in providing information required by actors of dairy innovation platform (3.53)					
2	Scientists and veterinary officers are more credible to the farmers (3.68)					
3	Dairy farmers most often use the information from fellow farmers as they are most credible (3.44)					
4	Farmers prefers Dairy Mela/Pasu palan mela(PPM) for source of information (3.43)					
5	Non-local communication channels involves the highest search costs to get the needed information (1.77)					
6	The use of local channels is declining over a period (2.04)					
7	Increasing literacy rate results in increased utilization by the farmers (2.66)					

Note :- MC-Most credible, C- Credible, LC- Least Credible, NC- Not Credible

Respondents - Input suppliers

PART- I

Region	District	Block	Village	Date

1. Name: _____

2. Age (Years): _____

3. Professional Qualification: _____

4. Institution (Place of work): _____

5. Year of experience: _____

6. Area of input supply:

Major area	Minor area
Animal Breeding	
Animal Feeding	
Animal Health Care	
Dairy Management Practices	
Other advisory services	

PART-II

7. Source of Information (Concerned Dairy farming practices) to farmers

Particulars		Frequently	Sometimes	Rarely
Animal Breeding				
Proper time of insemination				
Service period				
Pregnancy diagnosis				
Breed improvement	Selective/Cross breeding			
	Upgradation			
Others				
Animal Feeding				
Concentrate feeding				
Composition of concentrates				
Fodder				
Silage				
Mineral Mixture				
Colostrum feeding				
Quantity and type of green fodder				
Feed supplements				
Others				
Animal Health Care				
Naval cord				
Disbudding(within 1 month)				
Control of Endo parasite				
Disease/ Disorders treatment				
Control of Ecto parasite				
First aid kit				

Vaccination			
Prolapse management			
Treatment of anoestrus and repeat breeding			
Mastitis control			
Abortion control			
Others			
Dairy Management Practices			
Clean milk production			
Housing system			
Control of mosquito, ticks etc.			
Bedding material			
Cleaning of cattle shed			
Milking machines			
Manure management system			
Farm records			
Extreme weather control			
Others			
Advisory Services			
How to start dairy			
Training			
Marketing			
Linkage creation			
Meetings/ Kisan mandal/ Kisan ghosti			
Demonstrations			
Field trip/field day			
Others			

8 Innovation Platform

Particulars		1 = No contribution, 2 = Less contribution, 3 = Moderate contribution, 4 = High contribution,5 = Very high contribution			
		Researcher	Extension personnel	Input supplier	Farmer
Breeding	Proper time of insemination				
	Service period				
	Pregnancy diagnosis				
	Breed improvement				
	Others				
Feeding	Concentrate feeding				
	Composition of concentrates				
	Fodder seeds				
	Silage				
	Mineral mixture				
	Colostrums feeding				
	Quantity and type of green fodder				
	Feed supplements				
	Others				

Health care	Naval cord				
	Disbudding				
	Control of endo & ecto parasite				
	First aid kit				
	Vaccination				
	Prolyse management				
	Treatment of anoestrus and repeat breeding				
	Mastitis control				
	Abortion control				
	Others				
Management	Clean milk production				
	Control of mosquito, ticks etc.				
	Bedding material				
	Cleaning of cattle shed				
	Milking machines				
	Manure management system				
	Farm records				
	Extreme weather control				
	Others				

9. Credibility of actors in Dairy Innovation platform

Sl. No.	Statements	MC	C	Can't say	LC	NC
1	Resource person are more credible in providing information required by actors of dairy innovation platform (3.53)					
2	Scientists and veterinary officers are more credible to the farmers (3.68)					
3	Dairy farmers most often use the information from fellow farmers as they are most credible (3.44)					
4	Farmers prefers Dairy Mela/Pasu palan mela(PPM) for source of information (3.43)					
5	Non-local communication channels involves the highest search costs to get the needed information (1.77)					
6	The use of local channels is declining over a period (2.04)					
7	Increasing literacy rate results in increased utilization by the farmers (2.66)					

Note :- MC-Most credible, C- Credible, LC- Least Credible, NC- Not Credible