STUDY OF INDIGENOUS TECHNICAL KNOWLEDGE ON DAIRY FARMING IN KATHUA DISTRICT OF J&K

THESIS SUBMITTED TO THE
NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL
(DEEMED UNIVERSITY)
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER OF VETERINARY SCIENCE
IN
DAIRY EXTENSION EDUCATION

BY

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KARNAL – 132001 (HARYANA), INDIA

2012

Regn. No. 2121002

DEDICATED

TO

MY BELOVED

PARENTS

AND

MY SWEET SISTER

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Approved By

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CERTIFICATE

This is to certify that the thesis entitled, **"STUDY OF INDIGENOUS TECHNICAL KNOWLEDGE ON DAIRY FARMING IN KATHUA DISTRICT OF J&K"** submitted by **Ms. ADHITI BHANOTRA** towards the partial fulfillment of the award of the degree of **MASTER OF VETERINARY SCIENCE IN DAIRY EXTENSION EDUCATION)** of the **National Dairy Research Institute (Deemed University)**, Karnal, Haryana, India, is a *bona fide* research work carried out by her under my supervision, and no part of the thesis has been submitted for any other degree or diploma.

Dated: 16-06-2012

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MAJOR ADVISOR/GUIDE
&
CHAIRMAN, ADVISORY COMMITTEE

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[Adhiti Bhanotra]

Abstract

India has a very rich heritage of traditional health control and several treatment systems which have been percolating from one generation to another by oral transmission. Unfortunately, these practices, which are in vogue throughout the rural India, are little documented and there is danger of extinction of this knowledge. Thus it has become imperative to collect and document these practices and to assess their validity. Keeping this in view, present study entitled “Study of Indigenous Technical Knowledge on dairy farming in Kathua district of Jammu & Kashmir” was conceptualized.

The present study was conducted in Kathua district of the J&K. The Kathua district is having 8 blocks, out of which 3 blocks were selected randomly for the study and from each selected blocks, 2 villages were selected randomly. For the present study information was generated from 120 farmers, 20 from each selected village, who had at least one milch animal and those practicing ITKs at the time of investigation. Beside this 30 farmers were selected for validation constituting a total of 150 respondents for the study. Data for the study were collected by personal interview schedule and collected data were analyzed by suitable statistical tools. Majority of the respondents were having medium herd size and milk production. There were as many as 108 different ITKs that were documented through focus group discussion in the areas of breeding, feeding and health care practices. There were 12 ITKs (Indigenous Technical Knowledge) for breeding, 9 ITKs for feeding and 87 ITKs for different health care practices. Two ITKs each from Diarrhoea, Tympany and Pneumonia were selected for validation based on their degree of use in the region under study. The selected ITKs were validated using QuIK method and were found to be effective against respective ailments. The dairy farmers perceived ITK as more favourably accepted among the rural communities owing to its cost effectiveness, local availability in the flora and fauna of the village and lesser side effects. However, these were perceived to be comparatively less effective than the Modern Veterinary Drug (MVD) in numbers of animals cured and quickness of healing. Easy availability of local plants and herbs, deep knowledge and trust regarding ITK and distant location of veterinary hospital/dispensaries were the main factors that determine the use of ITKs by the dairy farmers.

सारांश

भारत में पशुओं की परंपारिक देखभाल की स्वदेशी प्रथा बहुत समृद्ध परंपरा का एक हिस्सा हैं । दुर्भाग्य से, इन प्रथाओं का, जिनका उपयोग र्गामीण भारत में प्रचलित है, इनके लिखित प्रमाण बहुत कम है तथा इन प्रथाओं का विलुप्त होने का खतरा है। इस समस्या को दूर करने के लिए, हमे स्वदेशी प्रथाओं का एक डेटाबेस बनाना चाहिए। इसे ध्यान में रखते हुए, वर्तमान अध्ययन "जम्मू और कश्मीर में डेयरी फार्मिंग पर स्वदेशी तकनीकी ज्ञान का अध्ययन" को ध्यान में रखा गया।

वर्तमान अध्ययन जम्मू और कश्मीर के कठुआ जिले में आयोजित किया गया कठुआ जिले 8 ब्लॉक, जिनमें से 3 ब्लॉक रॅन्डम ढंग से अध्ययन के लिए चयन किया गया था और प्रत्येक चयनित ब्लॉक से, 2 गांवों में रॅन्डम ढंग से चयन किया गया था । वर्तमान अध्ययन जानकारी के लिए 120 किसानों, 20 से प्रत्येक चयनित गांव है, जो जांच के समय में कम से कम एक दुधारू पशु और उन अभ्यास आई.टी.के. से उत्पन्न किया गया था । इस के अलावा 30 किसानों को मान्यता इस तरह के अध्ययन के लिए 150 उत्तरदाताओं की कुल करने के लिए चयन किया गया था ।डेटा के अध्ययन के लिए व्यक्तिगत साक्षात्कार अनुसूची के द्वारा एकत्र किए गए और एकत्रित किए गए डेटा उपयुक्त सांख्यिकीय उपकरण द्वारा विश्लेषण किया गया। और अंत में, परिणाम की उचित व्याख्या सावधानी से किया गया था।

किसानों का बहुमत (65.00%) पुराने आयु वर्ग के थे । किसानों के अधिकांश मध्यम आकार परिवार (60.00%), मध्यम झुंड आकार (68.33%) और मध्यम दूध उत्पादन (51.67%) कर रहे थे के रूप में कई के रूप में 108 विभिन्न आई.टी.के. है कि प्रजनन के क्षेत्रों में केंद्रित समूह चर्चा के माध्यम से किए गए थे। खिलाने और स्वास्थ्य देखभाल प्रथाओं। पशुओं के प्रजनन के लिए 12 (स्वदेशी तकनीकी ज्ञान) आई.टी.के., भोजन के लिए 9 आई.टी.के. और विभिन्न स्वास्थ्य देखभाल प्रथाओं के लिए 87 आई.टी.के. थे। चयनित पुष्टि आई.टी.के. संबंधित बीमारियों के खिलाफ प्रभावी होना पाया गया। हालांकि, इन अपेक्षाकृत ठीक जानवरों और उपचार के वेग की संख्या में आधुनिक पशु चिकित्सा औषधि से कम प्रभावी माना गया है। स्वदेशी प्रथाओं उनकी उपलब्धता, कम साइड इफेक्ट और कम लागत के संबंध में आधुनिक पशु चिकित्सा औषधि से बेहतर माना जाता था. आसान उपलब्धता, गहरा ज्ञान और विश्वास आई.टी.के., पशु चिकित्सालय / औषधालय, गैर उपलब्धता और पशु चिकित्सा दवाओं की उच्च लागत के दूरस्थ स्थान के बारे में मुख्य कारक है कि डेयरी किसानों द्वारा आई.टी.के. का उपयोग निर्धारित थे।

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LIST OF ABBREVIATIONS

Abbreviations used	Meaning
ADO	Agricultural Development Officer
ANOVA	Analysis of variance
BDO	Block Development Officer
d.f	Degree of freedom
DMRT	Duncan's Multiple Range Test
FMD	Foot and Mouth Disease
GOI	Government of India
H.S.	Haemorrhagic Septicaemia
IPR	Intellectual Property Rights
ITK	Indigenous Technical Knowledge
J&K	Jammu and Kashmir
M.S.S	Mean sum of square
MVD	Modern Veterinary Drug
N.A.R.S	National Agricultural Research System
N.G.O	Non Governmental Organization
QuIK	Quantifying Indigenous Knowledge
S.E	Standard Error
S.S	Sum of square
VDO	Village Development Officer
VLDA	Village Level Development Assistant
VO	Veterinary Officer
WHO	World Health Organization

CHAPTER - 1

Introduction

1. INTRODUCTION

India has a very rich heritage of traditional health control and treatment systems (Ayurvedic, Unani and Homeopathic) that have been used for animals since time immemorial. These practices have been percolating from one generation down to the next by oral transmission and considered to be the holistic approach for livestock management. The indigenous technical knowledge regarding animal husbandry is considered to be as old as domestication of various livestock species. Modern veterinary care reaches to only 20% of livestock owners of the World and approximately $ 10 billion are lost annually on account of livestock diseases (Nair, 2005). The absence of adequate allopathic conventional health care systems forces remote communities throughout the world to rely on traditional medicines for their primary health care (WHO, 2002) and veterinary care (Schillhorn, 1997 and Martin *et al.,* 2001).

The indigenous practices are not only cost effective but are socially compatible and generally comprise of easily available local flora/ingredients (Das and Tripathi, 2009). In addition to this, indigenous medicines have almost no side effects. Moreover, with the studies such as of Waller (1997) who reported that the modern medicines are becoming less effective in treatment and controlling of veterinary diseases, it is becoming more and more important to rediscover our traditional wealth of indigenous knowledge. It is also found that only about 30% of technologies generated from research institutions/agricultural universities have been transformed or adopted (Singh, S.P. 1995). So, a large number of farmers are still dependent upon traditional farming methods. But unfortunately, these practices, which are in vogue throughout rural India, are little documented and there is danger of extinction of this knowledge. Thus, it has become imperative to collect and document these practices and to assess their validity. In recent years, World Health Organization (WHO) has emphasized the importance of scientific investigations into indigenous herbal plants and has estimated that 80% of the world's population living in developing countries still relies on plants for health care (WHO, 1978).

Hence, a new directive, a new thinking and a new approach are necessary today to exploit and utilize the knowledge and experience of the farmers and development workers for meeting the future challenges in dairying in the Third World and other developing countries. The importance of documenting ancient/indigenous/traditional knowledge has recently gained a momentum all over the world including India. In USA, a Centre of Indigenous Knowledge and Rural Development (CIKARD) was established at IOWA University in 1987. In India, several non-government organizations like Bharatiya Agro Industries Foundation (BAIF) in Pune; Self Employed Women's Association (SEWA) in Tamil Nadu; Women's organization for rural development (WORD) in Ahmedabad and Grass Roots Innovation Augmentation Network (GIAN) in Gujarat are reported to be involved in documentation and validation of indigenous technical knowledge system.

For ages, human beings, in particular, the resource poor farmers and marginal societies around the world, have been utilizing locally available plant resources for formulating a wide range of plant based medicines for treating animal diseases as an economical, accessible, efficacious and ecologically sustainable means to animal health care practices

1.1 DEFINITION OF INDIGENOUS TECHNICAL KNOWLEDGE

The word 'indigenous' means "native born, originating or produced naturally in a country or in a specified area" and the word 'knowledge' means "assured belief, practical skill, that which is known, learning and enlightenment" (*Reijntjes et al., 1992*). ITK is the systematic body of knowledge acquired by the local people through the accumulation of experiences, informal experiments, and intimate understanding of the environment in a given culture (Rajasekaran, 1993). **I**ndigenous knowledge is characterized as the sum of experience and knowledge for a given ethnic group, which forms the basis for decision making in regard to familiar and unfamiliar problems and challenges.

1.2 THE NEED TO STUDY ITK

Attempts to impress researchers with the need to study traditional animal husbandry practices were already made in the late sixties. The study and appreciation of ITK is important because:

- ITK may have scientific basis and its technologies could be transferred to other similar farming situations.
- Documentation and screening of ITK is necessary before the valuable information is lost forever.
- ITK may be an alternative, a substitute or a complement to modern technology.
- ITK may generate ideas for future research.
- It is often easier to secure adoption of ITK than modern technology.

1.3 STATEMENT OF THE PROBLEM

It is a well known fact that the bearers of ITK's are basically the local people including farmers, rural artisans, landless labourers, rural women, animal husbandry practioners, etc, which earn their livelihood through their capacity of having systematic knowledge as well as knowing the mechanism of how indigenous practices work for various ailments of animal husbandry. The indigenous technical knowledge system also helps the ITK practitioners to cope with problematic situations and to survive even in the face of tremendous odds. Today, such indigenous technical practices are dwindling fast with the death of the owner, bearing scientific knowledge because such people who serve the community with great sacrifice and selfless motto in their minds are afraid to tell others about the usefulness of the drug looking to their exploitation. Hence, it is necessary to identify and document such indigenous practices for their further scientific validation in various national and international research organizations. The indigenous practices in the Kathua district are a part of rich traditions of animal care in India. J&K is a hilly state, lying in the lap of western Himalayas. The dwellers of this remote and hilly

region of the Himalayas are dependent almost entirely on their traditional indigenous knowledge and traditional healers to cure their animals. Although, these traditions are maintained since time immortal, they are depleting at a very high rate with the passage of time and increasing modernization. So far as the indigenous practices of Jammu and Kashmir are concerned there are few reports (Beigh *et al.,* 2003 and Rashid *et al.,* 2007). Only one survey has been carried out in Kathua district regarding documentation of ethnoveterinary plants before this study and the area is virgin in this context. Therefore, an attempt has been made to document and validate the indigenous practices related to livestock management in the Kathua district of J&K and find answers to the following questions:

1. What are the different indigenous technical knowledge being possessed by farmers with respect to dairying in J&K state?
2. Are the farmers satisfied with the use of indigenous practices?
3. What are the factors that determine the use of ITKs by the respondents?

Keeping all this in view, the present study entitled, **"Study of Indigenous Technical Knowledge on Dairy Farming in Kathua District of J&K"** was conducted with following objectives:

i) To analyse the socio-economic profile of the respondents.
ii) To identify and document the Indigenous Technical Knowledge (ITKs) prevalent in dairy farming.
iii) To validate the selected ITKs related to dairy farming.
iv) To identify the factors that determines the use of ITKs.

1.4 SCOPE OF THE STUDY:

1. The findings of this study will help the extension workers in understanding the knowledge of dairy farmer about various ITK related to animal husbandry.
2. The study will help in documentation of locally and easily accessible traditional practices where modern veterinary drug and veterinary services are not available or are too expensive.

3. Through documentation, it is possible to identify the beneficial aspect of traditional practices as well those that could be improved through science based technologies.
4. The study will help will help to identify and preserve plants having preventive and curative properties.
5. The validation of technologies in this study will help farmers in selection of ITKs.
6. The study will help to determine the factors that promote the use of ITKs by the dairy farmers.
7. The present study has practical utility to researchers working with the indigenous people, consultants dealing with ethno-veterinary medicines, scientists, field extension functionaries, etc. by making them aware of the merits and demerits of the indigenous technical knowledge pertinent to dairying.

1.5 LIMITATIONS OF THE STUDY:

Although every effort has been made to make this study as comprehensive as possible, it is subject to the limitations inherent in a single researcher project. Some of limitations are indicated below:

1. The study being a single student's dissertation project, suffers with usual limitations of time and resources.
2. The findings of the study are based on the ability of the respondents to recall and opinion expressed by them. Hence, complete freedom from individual bias and prejudices cannot be claimed.
3. The study is confined to only one district of J&K. So, universal applicability of results cannot be claimed.

Inspite of the above limitations, due attention was given to make this investigation more useful and as deep and systematic as possible.

1.6 ORGANIZATION OF THESIS

This dissertation has been organized in five chapters in logical sequence; the first chapter on introduction contains the relevant background information, statement of the problem, objectives and scope of the study along with its limitations. The chapter second deals with reviews of literature. 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 are presented in the third chapter. The findings of the present study along with discussion are presented in fourth chapter i.e. results and discussion. The fifth chapter deals with the summary and conclusions, which have emerged from the results of the study. Bibliography and appendices on information utilized in this study have been presented in the end.

CHAPTER - 2

Review of Literature

2. REVIEW OF LITERATURE

A review of literature is designed to identify related research, to set the current research project within a conceptual and theoretical context. It includes searching, assessing and integrating multiple researches on the topic of investigation. Commensurate with the objectives of the study, the available literature having direct or indirect bearing on the theme was scanned and presented chronologically under the following heads.

2.1 Concept of ITK

2.2 Socio economic profile of dairy farmers

2.3 Documentation of ITKs

2.4 Validation of ITKs

2.5 Factors that determine the use of ITKs by the dairy farmers

2.1 Concept of ITKs

The term indigenous knowledge, 'local knowledge' and 'traditional knowledge' have been used in the literature interchangeably.

- Indigenous Knowledge is unwritten, untapped and largely unutilized knowledge that is unique to a given culture and society. The importance of documenting IK is to widen and accelerate research, planning and development. **(Chowdhury & De,1993)**
- Indigenous Knowledge is the actual knowledge of a given population that reflects the experience based on traditions and includes more recent experience with modern technology. Indigenous knowledge system may appear simple to outsider but they represent mechanisms to ensure the minimal livelihoods for local people. **(Havekort, 1993)**

- ITK is the systematic body of knowledge acquired by the local people through the accumulation of experiences, informal experiments, and intimate understanding of the environment in a given culture. **(Rajasekaran, 1993)**
- Indigenous knowledge is the knowledge that people have gained through inheritance from their ancestors. It is a people derived science and it represents people's creativity, innovations and skills.**(Patel, 1993)**
- Indigenous knowledge is the sum total of knowledge and practices which are based on people's accumulated experience in dealing with situation, problems in various aspects of life and much knowledge and practices which are special to a particular culture **(Wang, 1998)**
- Indigenous technical knowledge is based on knowledge, beliefs and customs which are internally consistent and logical to those holding them, but at odds with objectively deduced findings of formal science **(Farrington,1988)**
- Indigenous knowledge has been termed in different ways e.g., ethno science (Knight,1974; Warren, 1976), village science (Barker et al., 1977), conventional environmental knowledge (Richards, 1979), indigenous technical knowledge (Chambers, 1979), folk ethology (Kerten and Uphoff, 1981) and traditional environmental knowledge **(Johnson, 1992)**
- While trying to clear up the mix-up in interchangeable use of words "indigenous knowledge" and "traditional knowledge". **Parasar (1994)** put forth the view that all indigenous knowledge are traditional by nature but not vice-versa. The knowledge is transmitted down from generation to generation which may after some years be given status of tradition or considered as traditional knowledge.

2.2 Socio-economic profile of the respondents

2.2.1 Age

Age is an important determinant for ascertaining the age groups of the respondents. Age of the farmers have been studied by some of the researchers with respect to personal profile of the respondents. **Srivastava (1982), Khatik (1994), Pandey**

(1996), Mandal (1999), Nagaraju (2001), Selvaraj (2002), Das (2003),Seeralan (2004), reported that majority of the respondents of the study area were middle-aged.

2.2.2 Education

The standard of the community depends upon the educational level of the members. A few number of researchers, engaged in studies, such as **Srivastava (1982), Pandey (1996), Nagaraju (2001), Selvaraj (2002), Das (2003) and Shinde (2011)** observed education level was very low among respondents of their respective areas.

2.2.3 Social participation

Srivastava (1982), Pandey (1996) discovered poor level of social participation among tribal farmers in their respective areas.

Selvaraj (2002) and Das (2003) reported less social participation; while **Khatik (1994)** reported growing magnitude of interest among indigenous farmers to be associated with various formal and informal social organizations like Self help groups, Adivasi Seva Society, etc.

2.2.4 Occupation

Srivastava (1982), Pandey (1996) reported that majority of the respondents had agriculture as primary occupation followed by labour and dairying; **Nagaraju (2001)** reported agriculture as the primary occupation and dairying as secondary subsidiary occupation.

2.2.5 Land holding

Srivastava (1982) reported that most of the farmers had small land holding followed by medium and large in their study area ; **Pandey (1996)** reported that majority had marginal land holding followed by small and landless farmers.

2.2.6 Annual income

Pandey (1996), Nagaraju (2001) and Selvaraj (2002) reported that majority had medium level of annual income followed by low and high level.

2.3 Documentation of ITK

2.3.1 Indigenous technologies in animal breeding

2.3.1.1 For inducing heat in animals:

Three to four seeds of *Semecarus anacardium* given for 3 to 4 days **(Gupta and Patel, 1992)**

Feeding kalijeera along with oil cake for inducing heat **(De, 1994)**

Feeding of Hing *(Ferula assafoetida)* and mustard cake (*Brassica* spp.) to the animals to induce heat **(Jha, 1998).**

Feeding of jaggery, common salt, pigeon faeces, sprouted wheat, masur dal (*Lens esculenta*), hen's egg mixed with oil cake, Arbi tubers(*Colocasia esculenta*), sprouted chhole (*Cicer ariestinum*), crushed soyabean (*Glycine max / Gycine suja*), 'Madua flour' (*Cynosurus coraccanus*) and sprouted 'Methi' seed (*Trigonelle foenumgraecum*) to the animals to induce heat **(Sah, 1999).**

Boiled methi (*Trigonella foenum- graecum*) grain @ 1kg/day fed empty stomach for 5 days or 1 kg/day bajra (*Pennisetum typhoides*) and ½ kg/day jiggery for 10-15 **(Chand, 2011).**

2.3.1.2 Repeat breeding

Feeding of only dry fodder to their animals up to 22 days following service in Bihar. **(Sah, 1996).**

Extract of Kela leaves (*Musa paradisica*) fed to cattle for the treatment of repeat breeding in Bankura district of West Bengal **(Mandal, 1999).**

2.3.1.3 Dystocia

Animal is allowed to swim in pond to correct Dystocia **(Meena, 2000)**

Animal is forced to move on uneven ground or rolling of animal is done **(Chand, 2011).**

2.3.1.4 Retention of placenta

Feeding of paddy, banana, and "Soanf" boiled in water and then filtrate given to animal in case of retained placenta **(Sah, 1996)**

Feeding of Kathal leaves or boiled paddy along with bamboo leaves were given for easy expulsion of placenta **(Pandey, 1996)**

Feeding of boiled paddy, bamboo leaves, Jack fruit leaves, tie Jasmine root on the neck and apply lime paste on horn of animal in case of retained placenta. **(Mohanty, 1999)**

Drenching the affected animal with castor oil (50 ml) is followed **(Eqbal, 2011).**

2.3.1.5 Prolapse of uterus and rectum

Animal is forced to stand and fed 2-3 kg tuber of elephant foot yam (*Amorphophallus compandulatum*) along with other feed **(Gupta and Patel, 1993)**

Animal, suffered from prolapse in past, given 10 kg of onion to eat when it is not carrying. This prevents prolapse at delivery time **(Koradia, 1999).**

Surukkuthamarai, Thottachinungi (*Mimosa pudica*) are to be macerated and administered orally to the animals **(Vivekanandan, 1996).**

2.3.1.6 Heat symptoms

Identified animal in heat by the symptoms like bellowing and mounting on other animals **(Jarial, 2006).**

2.3.1.7 Pregnancy Diagnosis

Urine turns whitish in case of pregnant animals **(Srivastava, 1982)**

External appearance, increase in body size and glossy outlook **(De, 1994)**

2..3.1.8 Abortion and stillbirth

Drenching desi ghee @ ½ litre/ day for 3-4 days **(Chand, 2011).**

2.3.2 ITK on animal feeding

Feeding of gur, methi, Rice bran and gundli grass increase milk yield in animals **(Srivastava, 1982).**

Date palm nuts are used as an energetic feed for bullocks **(Gupta and Patel, 1993).**

During rice transplantation bullocks are given country liquor of fermented rice to extract more work and feeding boiled rice along with refuses of vegetable to enhance milk yield was the most common one **(De, 1994).**

Feeding 2 kg of powdered Cumba (Bajra) grains and 1 kg of brinjal increases the milk output **(Vivekanandan, 1996).**

Cooked rice is provided to buffalo to enhance milk production and lactating cows are provided with refuses of vegetables and rice husk to increase milk production **(Mandal, 1999)**

Oilcake and salt is mixed with fodder once in 15 days to prevent general disorders. Cotton shells are boiled in water and fed to cattle and leaves of tamarind used as green fodder for bullocks in summer season **(Das, 2001).**

Provide concentrate to milch animals only and urea treatment of straw is done **(Jarial, 2006)**

Glyricidia is given to increase lactation and seeds of subabul are fed to animals to improve the milk secretion (**Ponnusamy *et al.,* 2009)**

Pods of babul were fed to lactating animals to increase milk yield or Gur, rice bran and bajra grass are fed to lactating animals to increase milk yield **(Eqbal, 2011).**

2.3.2.1 For increasing fat content in milk

Feeding fresh primordial of immature cotton ball **(Gupta and Patel, 1993).**

Feeding cotton seed, horse gram and bengal gram for improving fat content in milk (**Seeralan, 2004).**

2.3.2.2 Unconventional feeds

Leaves of Galo *(Tinospora cordifolia)* as green fodder and green foliage of drumstick tree **(Kalyana Sundaram, 1990)**

Parts of Baval *(Acacia Arabia)* mixed with flour of cereals and jaggery fed to animals **(Gupta and Patel, 1992)**

Ration of bullock consist of rice husk, oil cake, fermented rice, water and straw **(Mandal, 1999).**

Main source of green fodder were uprooted weeds and grasses, cultivated green fodder and leaves of fodder trees **(Jarial, 2006).**

2.3.3 ITK on health care

2.3.3.1 Abscess

Fomentation with warm mustard oil and firing with hot iron in the developing stage of abscess, while other use onion roasted in cow dung along with little common salt **(Srivastava, 1982).**

Turmeric powder *(Curcuma longa)* is mixed with deshi ghee in equal proportion and applied on the abscess **(Mandal, 1999).**

2.3.3.2 Constipation

100 ml castor oil given to animal or crushed bark of Arjun *(Terminalia arjuna)* mixed with water and fed to affected animals **(Mandal, 1999).**

200gm of gur dissolved in water is given **(Ponnusamy *et al.,* 2009).**

2.3.3.3. Diarrhoea

Linseed plant or soaked gram or thorn apple or arhar wood mixed with ash, salt and water are given to animal passing watery stool **(Gupta and Gupta, 1989)**

Pulp of 100 g old ripened *Tentul* (Tamarind, *Tamarindus indica*) is fed to the animal for two to three days **(Amitendu *et al.,* 2004).**

Farmers dissolve salt and sugar in 1:2 ratio in water and drench the animals 2-3 times a day **(Eqbal, 2011).**

2.3.3.4 Eradication of ectoparasite

Burning neem leaves near the animal in case of lice infestation **(De, 1994).**

Tobbacco shoot with kerosene oil were applied all over the body **(Pandey, 1996).**

2.3.3.5 Foot and Mouth Disease (FMD)

Majority of the farmers use Imli dissolved in water for feeding the animals. Barks of Babul boiled in water is used for washing mouth lesions. The animals are made to walk on sand at noon when the temperature is high **(Srivastava, 1982).**

A paste is prepared by burning the snails with shells and brush grass is applied in the affected hooves **(Kokate, 1984).**

The suspension of ajma (Trachyspermum ammi) 50 gm seed, jiggery 100 gm and tea powder 25 gm in half of water is given to the affected animal **(Gupta and Patel, 1993).**

Animals are made to walk in canal/river water or mud for controlling foot lesions; whereas leaves of Arhar and Fitkiri were rubbed on tongue in mouth lesions **(Pandey, 1996).**

The farmers of Banka district of Bihar allowed their animals to remain in mud for 10 h as treatment against FMD **(Sah, 1996).**

Banana fruits are soaked in castor oil overnight and fed to the animal. Pork is cooked with water from Samai *(Panicum miliare)* grains and fed to the animals **(Vivekanandan, 1996).**

A paste of the leaves of Sadad (*Terminalia crenulata*) is made and applied on the affected area **(Koradia, 1999).**

Affected animals are forced to walk on sand or foot leisons are washed with the help of spirit, alum, alcohol, phenyl etc. **(Mandal, 1999).**

Animal is made to stand in mud for 5-19 minutes or 50 milli-litre phenyl solution in 1 lit. water is given twice a day **(Jarial, 2006).**

2.3.3.6 Fever

Bark of rayan (*Soymida febriluga*) tree collected and powdered separately is given to animals along with water for 4 to 5 days continuously **(Gupta and Patel, 1992).**

Massage of the body with warm mustard oil along with garlic is done **(Pandey, 1996).**

In case of ephemeral fever, urine obtained from cows, leaves of Vellaikundumani *(Arbus precatorius)* bearing white seeds and Veliparuthi *(Pergularia daemia)* are to be pounded and fed to animal **(Vivekanandan, 1996).**

A part of onion (*Allium cepa*), Ajwain and Dhania mixed with jaggery is prepared and then given to sick animal **(Das, 2003).**

Turmeric- 50 gm, Ajwain- 100 gm and rock salt- 200 gm are mixed and applied on tongue **(Seeralan, 2004).**

2.3.3.7 Fracture

Application of paste prepared from stem and leaves of a plant Hadamode on the affected part and fixing it with bamboo splints **(Kokate, 1984).**

A mixture prepared from two spoonfuls of turmeric powder and a hen's egg is applied on the site of the fracture and covered it with five to seven leaves of Gundi *(Cordia gharaf)* **(Darji, 1993).**

Farmers of Rajasthan drench the animal with powered mixture of 'Gota of Runj' and nots of Ratanjot for 15 days. They also use some wrap of Ratanjot roots around fracture and raw eggs are fed to the affected animals **(Khatik, 1994).**

Bovine fat is melted and applied on the affected place or Egg and black gram *(Vigna mungo)* is grounded and applied in the fractured place and bamboo stick is tied around the fractured bone **(Seeralan, 2004 and Ponnusamy *et al.,* 2009).**

2.3.3.8 Wound

Application of specially prepared ash from burning the horn of buffalo mixed with the oil of kanji **(Khatik, 1994).**

About 3 to 4 droppings of goat and one or two leaves of aval *(Cassia auriculata)* are mixed together and applied daily over the animal's wound **(Patel et al., 1997).**

A handful of neem leaves, *Acorus calamus* leaves, ten pods of garlic, 3 to 4 naphthalene balls and some carbon powder from a waste battery are crushed and mixed together into a paste and applied on the affected part of the skin **(Prakash, 1997).**

2.3.3.9 Yoke gall

Firing with red hot iron in case of pus formation in the swelling of yoke gall. The wound is then washed with boiled neem leaves **(Srivastava, 1982).**

Farmers prepare a charcoal from the Kesada *(Capparis decidual)* wood. Powdered coal is pasted on the ulcer to minimize the pain and help in recovery **(Gupta and Patel, 1991).**

Two hundred grams of onion peels burn and mixes the ashes with some butter and apply the paste to the yoke gall of the bullock **(Patel et al., 1997).**

2.3.3.10 Tympany

Tribal Mundas give their animals onion (1/2 kg), ajwan (1/2 chatak), black salt (1 chatak) and hing (1/2 tola) mixed with 1 lit. of water. Some of them use turpentine oil, 1 ounce mixed with ½ kg linseed oil **(Srivastava, 1982).**

A mixture of whey milk, onion and leaves of Sitafal is given to the animals **(Gupta and Patel, 1993).**

Drenching the animals with a mixture of turmeric powder, common salt and whey is common practice **(Khatik, 1994).**

Ajwain, Hing and Black salt were given to animal **(Pandey, 1996).**

Soda (Sodium bicarbonate) and mustrad oil *(Brassica nigra)* mixed together and poured in a litre of water and then drenched **(Mandal, 1999).**

2.3.3.11 Swelling of throat

Dried flower of Mahua *(Madhuca indica)* and crushed bark of Khejur *(Pheonix sylvestris)* are fed alongwith green fodder **(Gupta and Patel, 1992).**

Application of paste prepared from 'Pan' *(Piper betle)* mixed with ghee or warm mustard oil *(Brassica nigra)* on the swelling part of throat **(Mandal, 1999).**

2.3.3.12 Sprain

Bark of jamun tree *(Syzyzium jambos)* is grounded and applied **(Seeralan, 2004).**

2.3.3.13 Eye related diseases

An unusual solution is chewing common salt and spitting it into the injured eye of the animals **(Sharma, 1999).**

Crepe jasmine *(Erratamia coronaria*), thumbai and clove (*Syzyzium aromaticum*) are taken into equal quantity and juice of this extract is applied on the eyes or eyes are washed with tobacco (*Nicotiana tabacum*) mixed water **(Ponnusamy *et al.,* 2009).**

2.3.3.14 Poisonous bite

A handful of leaves of each plant, namely Siriyanangai *(Polygala grinerisis),* Periyanangai *(Andrographis alata),* Kottagasalai, Kupaimeni, Arugambal *(Cynodon dactylon)* are to be grounded into paste. The mixture is added to 100 ml of neem oil and 200 ml of warm water and administered **(Vivekanandan, 1996).**

Sacred basil and *Acalypha indica* are crushed and the juice is poured in the nostrils of affected animal or Pelican flower (*Aristolochia gigas*) is grounded and mixed with equal quantity of butter and given to animal for one week **(Seeralan, 2004).**

2.3.3.15 Urinary problems

Approximately 500 gm of sodium bicarbonate is dissolved in one litre of water and the solution is given to the animal **(Gupta and Patel, 1992).**

The green bark of jamun tree is crushed and the extract is given to animals having urinary blockage in the morning and once in the evening for three days **(Patel *et al.,* 1997).**

One kg of Chattodi *(Boerhavia diffusia)* roots are boiled vigorously in two and half litres of water till the quantity of water reduces to one litre. The decoction is stored in

vessel and administered to the animals having urinary trouble for 2 to 3 days at a dose of 100 ml/day **(Patel 1998).**

2.3.3.16 Maggot infestation

The leaves of *Erythrina mysorensis* are crushed and mixed with eucalyptus oil. The mixture is applied on the affected part of the animal and the wound is covered with a bandage. After 3 days, the bandage is removed and the wound is pressed softly so that the maggots come out **(Prakash, 1997).**

2.3.3.17 Swollen udder

The juice of pilodi *(Salvadora persica)* leaves are used to cure this condition. This juice is applied on the swollen udder twice a day **(Patel *et al.,* 1997).**

250 gm of coriander is fed twice a day **(Seeralan, 2004).**

Juice of lemon and powdered chalk piece ($CaC0_3$) are mixed with water and applied on the udder **(Ponnusamy *et al.,* 2009).**

2.3.3.18 Arthritis

Decoction of the root of Babul (*Acacia Arabica*) is mixed with mustard oil in the ratio of 1:3 and to be drenched to the animal **(Amitendu *et al.,* 2004).**

2.3.3.19 Mouth ulcer

Lukewarm pure mustard oil smeared on the neck proves to be an effective remedy for the pain **(Sharma, 1999).**

2.3.3.20 Food poison

Chotrukatrazhai *(Aloe vera)*, Vanai nerunji *(Pedalium murex)*, Athi *(Bauhinia racemosa)* are to be crushed together and it is mixed with water and administered to the animals three times in a day with the help of kottan (hallow bamboo funnel) **(Vivekanandan, 1996).**

2.3.3.21 Respiratory diseases

Ruptured leaves of Bahufali *(Corchorus sp.)* is fed to the bullocks which breathes too much during work **(Gupta and Patel, 1992).**

The use of Kupaimeni *(Acalypha indica)* is widely acknowledged for curing the respiratory disorders, dry cough, bronchitis, lung ulcers **(Venkatasubramanium and Fulzele, 1993).**

2.3.3.22 Jaundice

A mixture of 'haritake' (*Terminalia chebula*), Amla *(Emblica officianlis*) is prepared and fed to the animals twice a day **(Mandal, 1999).**

Turmeric is grounded and made into arecanut size and given to animals **(Seeralan, 2004).**

2.3.3.23 Intestinal worms

Extract of 'neem' leaves (Azadirachta indica) mixed with water and sugar and then drench it **(Mandal, 1999).**

Seeds of Subabul *(Leuceana leucocephala)* is mixed with water and grounded. This mixture is taken with 200ml of water and given to goats **(Seeralan, 2004).**

2.4 Validation of ITKs

Administering mixture of onion 500gm, molasses 250gm, black salt 25gm and soda 25gm as a cure for tympany got the highest validity score of 115 **(De, 1994).**

Application of tobacco inside the nostrils or even common salt to kill leaches was considered to be most valid practice **(Selvaraj, 2002).**

reported that administering juice of Kattalai and Nerinji with Moringa flowers and Adalsa for inducing heat in animals and feeding Glyricidia for increasing milk production were considered to be most valid practice **(Seeralan, 2004).**

Topical application of grounded Halud (Turmeric, *Curcuma domestica*) in case of wound and Juice of *Anarash* (Pine apple, *Ananus comosus*) leaves which is mixed with water and then drenched 100 ml daily for 2-3 days in case of diarrhoea were considered to be most valid practice **(Amitendu *et al.,* 2004).**

Administering juice of Nerinji, Moringa flowers, and Adalsa with 300ml of neem oil for inducing heat in animals, 3gm of thorn apple seeds, 20gm arecanut and 500gm white clay mixed with rice gruel in case of Diarrhoea and Feeding Glyricidia for increasing milk production were considered to be most valid practices **(Ponnusamy *et al.,* 2009).**

2.5 Factors that determine the use of ITKs by the dairy farmers/ respondents

Lack of knowledge of scientific practices by the dairy farmers, lack of resources in form of non-availability of feeds and fodders, High cost of veterinary medicines, and Meagre extension efforts were the main factors that determine the use of ITKs by the dairy farmers **(Srivastava, 1982).**

Lack of knowledge about scientific practices, Non-availability of the trained personnel at the dispensary and lesser side effects of ITKs were the main factors **(Pandey, 1996).**

Easy and local availability of medicinal plants in the study area, High cost of veterinary medicine and lack of knowledge about improved dairy farming practices were the main factors **(Mandal, 1999)**

Lack of facilities of Veterinary Officer, high incidence of repeat breeding in dairy animals, poor conception rate of A.I., lack of semen at village level, lack of veterinary hospital at village level and lack of knowledge regarding improved dairy farming practices were main factors. **(Meena, 2000)**

Lack of A.I centre, ill equipped A.I centre, lack of services at A.I centre in the study area, lack of knowledge about the scientific dairying farming practices and lack of transportation facilities in the area were the main factors. **(Selvaraj, 2002)**

Lack of knowledge in different areas of dairying, Non-availability of veterinary staff in the area, Poor conception rate through A.I, Lack of linkage and coordination among different extension agencies were the main factors **(Jarial, 2006)**

Non-availability of veterinary hospitals, high cost of treatment, ignorance about government facilities and timely non-availability of vaccination were main constraints **(Sharma *et al*., 2010)**

CHAPTER - 3

Research Methodology

3. RESEARCH METHODOLOGY

Research methodology is considered to be a 'blue-print' of the research architect. The term methodology, in broad sense, refers to the process, principles and procedures by which we approach our problem and seek its answer. In social science, the term "methodology" is applied to know about how one carries out the process of research. In this chapter, an attempt has been made to explain the various methods and procedures followed to investigate the problem with the following sub-heads:

3.1 LOCALE OF THE STUDY:

The present study was undertaken in Kathua district of the Jammu and Kashmir. The said state and district was selected because of the following reasons:

A) Selection of state

Jammu region was selected for the research because of the following reasons:

- In J&K, Jammu region stands second in livestock population.

Photo 1: Panoramic view of study area

Photo 2: Background of inhospitable terrain

- Dwellers of this remote and hilly region of the Himalayas are dependent almost entirely on their traditional indigenous knowledge and traditional healers to cure their animals.
- The indigenous traditional occupation of farming and animal husbandry forms the backbone of the economy of the state

(18th livestock census -2007, NDDB 2008-09)

A) Selection of district

- Kathua district of J&K was selected due to familiarity of the investigator with the study area, local language and local people which helped in data collection in view of the nature of the study.
- Kathua district stands first in livestock population in Jammu region. (18th livestock census -2007).
- Kathua region is conservatory of indigenous practices and the people of the region depend largely on the traditional animal husbandry practices for treatment of animals.
- It is the third-largest city in the Duggardesh (Jammu) region and the sixth-largest in the state.

3.1.1 DESCRIPTION OF THE STUDY AREA

Kathua district is located in the extreme south of the Jammu and Kashmir state. It is one of the most strategically placed district as it provides only road and rail link to the rest of the country. Kathua district, the gateway of J&K lies between 32^0 17' to 32^0 55' North Latitude and 75^0 70' to 76^0 17' East longitude and it is 88 kilometres south of the state's winter capital of Jammu. The district of Kathua is bounded by the country of Pakistan in the south- west, Udhampur in the north-west, Jammu in the west, Doda in the north, Himachal Pradesh in the north- east and Punjab in the south- east. The district comprises of five tehsils viz., Kathua, Hiranagar, Basholi, Billawar and Bani. It has an area of 2,675 sq km constituting 1.9% of the total area of the state. The total geographical area of Kathua varies between alluvial sandy loam in plains of Hiranagar and Kathua to gravel in the Kandi area of the district. The climate varies widely over the district ranging from subtropical in the command blocks viz. Barnoti, Ghagwal, Hiranagar and Kathua

to temperate in the blocks of Bani and Lohai Malhar, whereas Basholi and Billawar blocks are in intermediate zone. Thus, there is potential of growing wide range of agricultural and horticultural crops year round. The district gets maximum rainfall during the month of July to August. About 13% of the Gross Domestic Product (GDP) of the State is contributed by Animal Husbandry in the overall 33% contribution by the Agriculture sector. There are eight Veterinary hospitals/polyclinics in kathua district. About 79% population in Jammu Division is based in rural areas, depending mostly on the income generated by the Agriculture and Animal Husbandry Sectors.

Fig: 3.1 Map of J&K state showing Kathua district

3.1.1 PROFILE OF THE STUDY AREA

Table- 3.1 Profile of the Kathua district of J&K

Particulars	**Values**
Geographical location	Latitude 32^0 17'N to 32^0 55'N Longitude 75^0 70'E to 76^0 17'E
Total geographical area	2,675 sq kms
Population	615,711
Tehsils	5
No. of blocks	8
No. of villages	575
Total population Rural population Urban population Male population Female population	6,15,711 5, 27,176 (85.62%) 88,535 (14.38%) 3,27,953 2,87,758
Proportion to J&K population	4.91%
Livestock population Cattle Buffaloes Sheep Goat	 2,35,969 81,309 2,67,932 2,00,739
Land utilization Total cropped area Net irrigated area Net unirrigated area Forest Wild life area Total forest area	 1.29 Lakh ha 17653 ha 43357 ha 991 sq km 44.75 sq km 1035.75 sq km
Literacy rate	73.50%
Language	Dogri
Annual Rainfall	1420-1570 mm
Principal Crops	Wheat, Rice and Maize

Source: www.kathua.nic.in

3.1 SAMPLING DESIGN

Sampling design include selection of the study area, blocks and the ultimate respondent households. The process has been elaborated in the following paragraphs.

3.2.1 Sampling plan

J&K was purposively selected for the research. J&K state consists of 22 districts. Out of these districts, Kathua district was purposively selected. Kathua district having 8 blocks, out of which 3 blocks namely Billawar, Hiranagar and Barnoti were selected randomly for the study and from each selected blocks, 2 villages were selected randomly. After selecting villages, a list of farmers who had atleast one milch animal and practising ITK was prepared and out of those 20 farmers were selected randomly from each block constituting 120 respondents. Besides this 30 farmers were selected for validation making a total of 150 farmers.

3.2.2 Selection of the respondents

The respondents who were having at least one milch animal and those practicing ITKs were selected randomly.

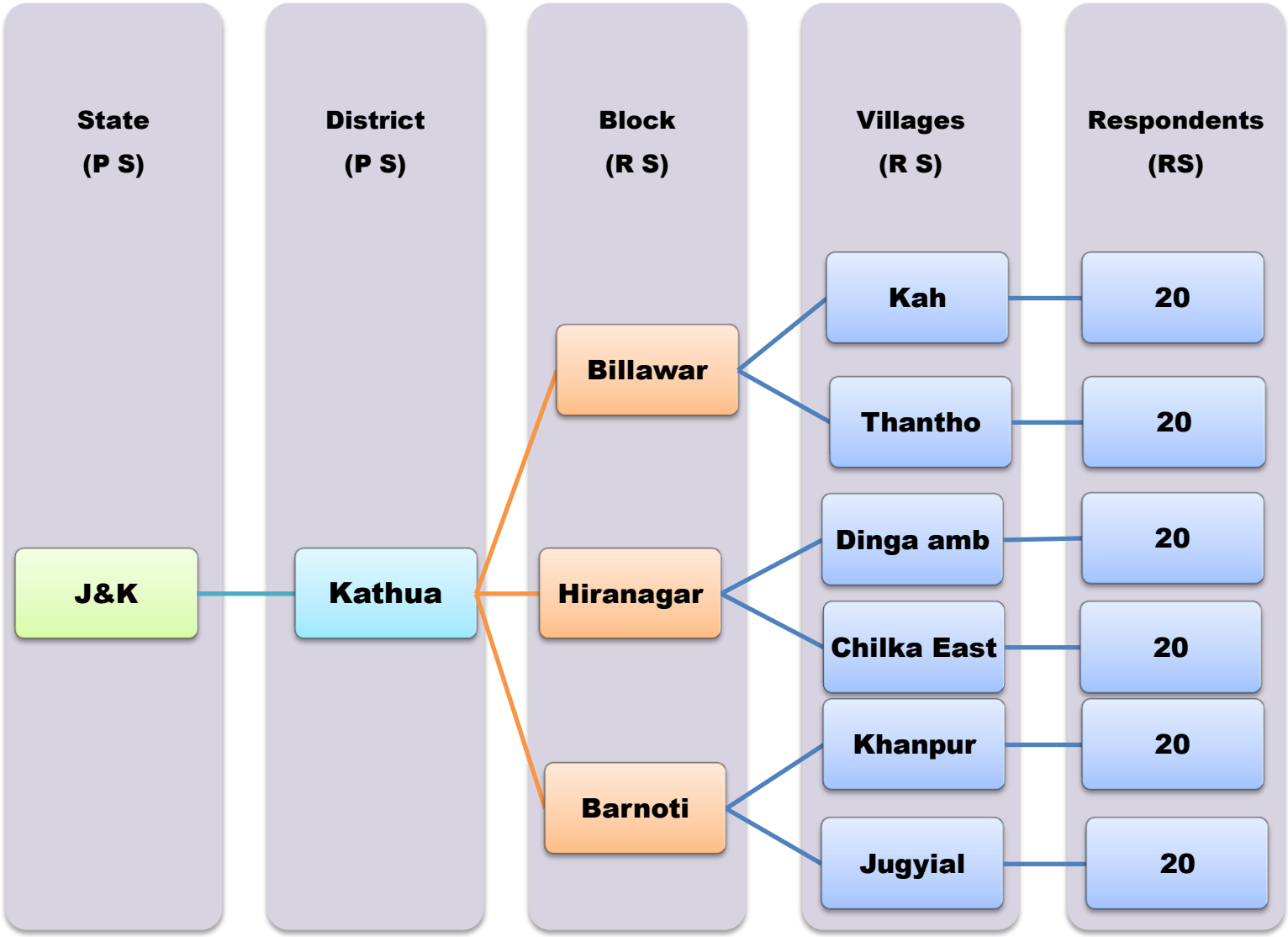
3.3 RESEARCH METHODS AND APPROACH

Research approach and methods is the backbone of any research endeavor. There are various approaches to social science research: qualitative, quantitative and mix of both. This section describes the approach and methods incorporated in this research.

3.3.1 Qualitative Research

Qualitative research provides in-depth understanding of problem or issue on which research is based. Selected tools of Participatory Rural Appraisal (PRA) were used in the initial part of this research. Combination of PRA methods were used to facilitate methodological triangulation to ensure validity. Accordingly Direct observation, Focus group discussion and Semi-structured interview were used in the study.

Fig 3.2 Sampling plan



3.3.1.1 Direct observation

It is systemically observing objects, events, processes, people and recording these observations. Direct observation is a good way to cross-check respondents' answers. (Ray and Mondal, 2004). The prevalence of diseases of dairy animals and the treatment provided by respondents during the period of study was observed in the sample villages and noted. For the present study observation was done for identification and selection of ITKs and for understanding traditional knowledge systems.

3.3.1.2 Focus Group Discussion

Focus groups selected were a homogenous group of farmers considered optimal for attaining in-depth information about indigenous technical knowledge (ITK). It gave better information than could be obtained in a much more time consuming exercise of individual interviews with the same people. The intent of focus group discussion is to promote self-disclosure among participants (Krueger and Casey, 2000).For this study focus group discussion was used for obtaining information on the most common veterinary ailments and treatments for curing and rationale for using different indigenous technical knowledge (ITKs). Thus documentation of ITKs was done through focus group discussion (Photo 2) with the farmers of the study area. It is the conversion of traditional knowledge information provided by communities into written documents. The main aim of such documentation is to ensure that information is not lost and to protect communities by showing that such information is prior art.

3.3.1.3 Semi-structured interview

It is one of the main tools used in participatory research. Here, instead of formal schedule a checklist of questions as flexible guide is used. Most of the questions were formulated during the interview, as in a journalistic interview (Ray and Mondal, 2004).

Photo 3: Documentation of ITKs through focus group discussion

3.3.1 Quantitative Research

This type of research where data can be quantified of subjects in scores is called quantitative research. A true interplay of methods will help to arrive in clear cut results. In this study quantitative approach was used for validation of indigenous technical knowledge (ITKs) and for factors that determine the use of ITKs.

3.3.2.1 Validation of ITKs

It refers to the degree to which the practices are realistic.Validation of ITKs was done by QuIK (Quantification of Indigenous Knowledge) method developed by Anne K de Villiers (1996). QuIK methodology involved a rapid and relatively cheap way to elicit indigenous technical knowledge. The basic premise of this method is that farmers know and understand the environment in which they farm and that answers to many questions can be found in the collective experience of the farming community and doing informal experiments over years.
Based on literature and on consultation with experts, six attributes were selected for rating the Modern Veterinary Drug (MVD) and selected Indigenous Technical Knowledge (ITKs). The attributes were:

- Effectiveness
- Side-effects
- Cost effectiveness
- Availability
- Quickness in healing
- Ease in preparation

The criteria for rating the Modern veterinary drug (MVD) and for selected ITKs on the basis of these six selected attributes were done by the score given by 30 farmers on five point continuum ranging from least to highly suitable.

Scores collected from the farmers on several attributes were subjected to one-way analysis of variance (Snedecor and Cochran, 1989). Analysis was carried out separately for each group of data under each criterion under a particular disease studied. To test the difference of means among alternatives and to

identify the best practice Duncan's Multiple Range Test as modified by Kramer (1957) was followed.

3.3.2.2 Identification of factors that determine the use of ITKs.

In this study, factors' determining the use of ITK is operationally defined as those factors which influence the use of ITK by the dairy farmers.

For the purpose of identifying the factors semi structured interview schedule was developed. The top most frequent factors were selected for the purpose of their prioritization by means of using Garret Ranking Technique.

Then, the respondents were asked to rank each of the factors relevant to them according to the degree of importance as perceived by them. As all the items were not ranked by all the respondents the method of combining of incomplete order of merit ratings as suggested by Garret (1981) was followed.

The formula for percent position as suggested by Garret (1981) is

Percent position = 100 (R-0.5)÷N

Where R is the rank of the individual item in the series and N is the number of individual items ranked.

Score for each of the factors after transmutation of orders of merit as per Garret (1981) was found out. To obtain the final order of merit, the scores for all the respondents for each of the factor were summated and the mean value was calculated. In finding out the mean values, the sum of the scores for each item was divided by its frequency of responses.

3.4 VARIABLES AND THEIR MEASUREMENTS

For any study undertaken in social 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 were selected for the study. Table 3.4 depicts the variables and their respective measurement at a glance. The selected variables

and their operational definitions and measurement procedures have been dealt in detail as follows:

Table- 3.2 Variables and their measurement

S. No.	Variables	Measurement
Socio-personal variables		
1)	Age	Direct questioning (Classification as reported by G.O.I)
2)	Education	Somasundaram (1995) scale with slight modification
3)	Family type	Direct questioning
4)	Family size	Direct questioning
Socio-economic variables		
5)	Occupation	Schedule was developed
6)	Land – holding	Classification as reported by G.O.I (2001)
7)	Herd – size	Schedule was developed
8)	Milk production	Schedule was developed
9)	Milk sale	Schedule was developed
10)	Milk consumption	Schedule was developed
11)	Total annual income	Schedule was developed
Communication variables		
12)	Social participation	Schedule was developed
13)	Mass media exposure	Schedule was developed
14)	Extension contact	Schedule was developed

3.4.1 OPERATIONALISATION OF VARIABLES

Operationalisation is the process of defining a concept so as to make the concept clearly distinguishable or measurable and to understand it in terms of empirical observations. The operational definitions of the variables in present study are given below:

3.4.1.1 Socio-personal variables

1) Age

It was operationalised as the number of completed years of the respondents at the time of data collection and it was determined by direct questioning. The respondents were classified on the following three categories (Census report, GOI, 2001)

S. No	Category	Years
1	Young	Up to 35
2	Middle	36-50
3	Old	Above 50

2) Family size

It refers to the number of individuals living under the same roof and sharing kitchen together in a household. It was measured by assigning one score to each family member. The respondents were classified into small, medium and large family size on the basis of cumulative square root frequency method.

3) Education

It was operationalised as the level of formal education attained by an individual respondent. It was measured by direct questioning. The scoring procedure followed by Somasundaram (1995) was followed with slight modification. The respondents were assigned score as:

Category	Score
Illiterate	0
Functionally literate	1
Primary	2
Middle	3
Secondary (upto matric)	4
Higher secondary (upto 12^{th})	5
Graduate and above	6

3.4.1.2 Socio-economic variables

4) Occupation

Occupation is the means of livelihood of a person or a family. Operationally, it was defined in terms of the farmer's source of earning viz., Agriculture, Dairying, Labour, Services, Business, etc. For this, schedule was developed and respondents were asked to indicate their source of livelihood. Frequency distribution was used to classify the respondents.

5) Operational Land - holding (ha)

It was operationally defined as the total number of hectares of land owned and leased in by an individual family at the time of investigation. It was determined by a schedule developed for the same. The respondents were classified into landless, marginal, small, semi-medium, medium and large categories as follows (suggest by G.O.I., 2001):

	Category	No. of Hectares
a)	Landless	0 ha
b)	Marginal	< 1 ha
c)	Small	1-2 ha
d)	Semi- medium	2-4 ha
e)	Medium	4-10 ha
f)	Large	>10 ha

6) Herd size

It refers to the total number of cattle and buffaloes owned by the respondent at the time of investigation. This was determined by a schedule developed for the

same. The respondents were classified into small, medium and large herd size on the basis of cumulative square root frequency method.

7) Total Milk production (litre/day/household)

It was defined as total quantity of milk (in litres) produced in a household by all the milch animals, one day prior to investigation. 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.

8) Milk sale (litre/day/household)

It refers to the total quantity of milk sold (in litres) by the household, one day prior to investigation. It was determined by developing a schedule for the same. The respondents were classified into low, medium and high on the basis of cumulative square root frequency method.

9) Milk consumption (litre/day/household)

It was operationalised as the total quantity of milk consumed (in litres) by the family members, one day prior to investigation. It was determined by developing a schedule for the same. The respondents were classified into low, medium and high on the basis of cumulative square root frequency method.

10) Total annual income (₹)

It is operationally defined as the income generated from various sources in one year. Incomes from different enterprises were asked from the respondents with the help of the developed schedule for the same. Respondents were categorized into low, middle and high categories on the basis of total annual income on the basis of Cumulative Square Root Frequency method.

3.4.1.3 Communication variables

11) Mass media exposure

Mass media exposure is the degree to which an individual is exposed to the mass media with respect to an innovation. It was measured in terms of radio listening and television watching behaviour, newspaper and other literature readership and exposure to educational films, and exhibition with respect to various aspects of dairying and animal husbandry. The response of the respondents was obtained on four point continuum i.e. mostly, often, sometimes and never and score of 3, 2, 1 and 0 were assigned respectively. The respondents were classified in terms of having low, medium and high mass media exposure on the basis of cumulative square root frequency method.

12) Social Participation

It refers to the involvement of an individual in any formal as well as informal social organization / institution of a member or office bearer. A schedule was developed to measure social participation of the respondents of the study area. The respondents were classified in terms of having low, medium and high participation on the basis of cumulative square root frequency method.

Category	Score
Non- member	0
Member of one organization in past	1
Member of one organization in present	2
Past office bearer	3
Present office bearer	4

13)Extension Contact

It refers to the extent of contact made by the respondents with the change agents such as village level development agent, stockman, veterinary assistant surgeon, agricultural development officer, BDO, Dairy Extension personnel, specialist from university/research institute etc. A structured schedule was used to measure the frequency of visit from both the sides. The respondents were scored on 5-point continuum scale namely, weekly, fortnightly, monthly, half yearly and never. The scoring system followed was 4,3,2,1 and 0 respectively for the five points on the scale. The respondents were classified in terms of having low, medium and high contact on the basis of cumulative square root frequency method.

3.5 DATA COLLECTION

A semi structured interview schedule was developed in light of the objectives and variables incorporating all the items in which information was required and was pre-tested among respondents from non sample areas. Accordingly, ambiguous questions were removed and schedule was edited. The data included information about socio-personal, socio-economic, communication traits of the respondents as well as documentation and validation of ITKs and factors that determine the use of ITKs by the farmers.

3.6 TABULATION OF DATA

The collected data were tabulated keeping in mind the objectives of the study and the ease of statistical analysis.

3.7 STATISTICAL ANALYSIS

The data collected from the dairy farmers were scored, tabulated and analyzed in the light of the objectives set forth for the present study. Statistical measures used in this study include mean, frequency, percentage, Cumulative square root frequency, ANOVA (Analysis of Variance), Duncan's Multiple Comparison Test (DMRT) and Garret Ranking Technique.

Results and Discussion

4. RESULTS AND DISCUSSION

This chapter contains the results obtained from analysis of data collected from the different farmers in accordance with the objectives of the study followed by discussion. The results have been presented under the following heads.

4.1. Socio-economic profile of the respondents

4.2. Distribution of respondents according to herd size

4.3. Documentation of ITKs prevalent in dairy farming.

4.4. Selection of most commonly used ITKs

4.5. Validation of selected ITKs using QuIK method

4.6. Factors determining the use of ITKs by the respondents.

4.1. SOCIO-ECONOMIC PROFILE OF THE RESPONDENTS

4.1.1 Age

The study revealed that majority (65.00%) of the farmers belonged to old age group (>50 yrs) followed by the category of middle age group ranging from 36 to 50 yrs of age and young (upto 35 yrs) which accounts for 31.67 percent and 3.33 percent respectively. It was observed that minimum age was 35 years and highest age was 89 years.

4.1.2. Education

The study revealed that 31.67 percent of the respondents were illiterate, 1.67 percent were functionally literate, 14.17 percent were in primary level, 20.00 percent were in middle level, 24.16 percent were educated up to secondary level, 5.00 percent up to higher secondary level and 3.33 percent were graduate and above. (Table 4.1)

Table 4.1 Socio- personal profile of the farmers

S.No.	Variables	Respondents (n = 120)	
		Frequency	Percentage
1.	Age (years)		
	Young (upto 35)	4	3.33
	Middle (36–50)	38	31.67
	Old (>50)	78	65.00
2.	Education		
	Illiterate	38	31.67
	Functionally Literate	2	1.67
	Primary	17	14.17
	Middle	24	20.00
	Secondary	29	24.16
	Higher Secondary	6	5.00
	Graduate and above	4	3.33
3	Family Size (no. of persons)		
	Low (<5)	24	20.00
	Medium (5 –7)	72	60.00
	High (>7)	24	20.00
4.	Family Type		
	Nuclear	52	43.33
	Joint	68	56.67
5.	Social Participation		
	Low (<1)	59	49.17
	Medium (1-2)	52	43.33
	High (>2)	9	7.50

4.1.3. Family Size

Majority (60.00%) of the respondents were having medium sized family i.e. 5 to 7 members followed by the low sized family having less than 5 members and high (>7 members) family size which were 20.00 percent each (Table 4.1)

4.1.4. Family type

Majority (56.67) of the respondents in the study were having joint family and 43.33 percent respondents were having nuclear family. (Table 4.1)

4.1.5. Social participation

Table 4.1 showed that 49.17% of the respondents were having low social participation followed by 43.33 percent and 3.33 percent having medium and high social participation respectively.

Table 4.2 Socio-economic profile of the farmers

S. No.	Variables	Respondents (n = 120)	
		Frequency	Percentage
6.	Occupation		
	Agriculture + Dairy	59	49.17
	Agriculture + Dairy + Service	31	25.83
	Agriculture + Dairy + Business	23	19.17
	Labour + Dairy	7	5.83
7.	Land Holding (ha)		
	Landless (0)	4	3.33
	Marginal (< 1)	58	48.33
	Small (1-2)	47	39.17
	Semi-medium (2-4)	8	6.67
	Medium(4-10)	3	2.50
	Large (>10)	0	0.00
8.	Total Annual Income (₹)		
	Low (<50,000)	50	41.67
	Medium(50,000-1,50,000)	48	40.00
	High (>1,50,000)	22	18.33

S. No.	Variables	Frequency	Percentage
9.	Total Herd Size (no. of animals)		
	Small (< 3)	31	25.84
	Medium (3-7)	82	68.33
	Large (>7)	7	5.83
10.	Milk Production (litres/day/household)		
	Low (< 3)	43	35.83
	Medium (3-6)	62	51.67
	High (>6)	15	12.50
11.	Milk Consumption (litres/day/household)		
	Low (< 3)	64	53.33
	Medium (3-5)	50	41.67
	High (> 5)	6	5.00
12.	Milk Sale (litres/day/household)		
	Low (< 3)	4	3.33
	Medium (3-6)	24	20.00
	High (> 6)	9	7.50
	No sale	83	69.17
13.	Milk disposal pattern		
	Milk sold occasionally	83	69.17
	Cooperative	6	5.00
	Directly to consumer	30	25.00
	Hotel or Halwai	1	0.83

4.2.1 Occupation

Data in the table 4.2 revealed that 40.83 percent farmers engaged in agriculture with dairy, 30.00 percent in agriculture + dairy + service, 25.00 percent in agriculture + dairy + business and 4.17 percent in dairy + labour.

4.2.2 Land Holding

Table 4.2 revealed that 48.33 percent of the respondents were in the category of marginal landholding, 39.17 percent were in small category, 6.67 percent were in

semi-medium category, 3.33 percent were in landless category, 2.50 percent were in medium category of landholding and none of the respondents were having large land holding category.

4.2.3 Annual Income (₹)

Results presented in the table 4.2 indicate that 41.67 percent of the respondents were in low annual income category (<50,000) followed by medium (50,000-1,50,000) and high (>1,50,000) income category comprising of 40.00 percent and 18.33 percent respectively.

4.2.4 Total Herd Size

Rearing of cattle has always remained as a symbol for honor in the farming community. It is clearly enunciated from table 4.2 that majority of farmers i.e. 68.33 percent belonged to medium herd size category (3-7 animals) where as 25.83 percent farmers belonged to small herd size (<3) and 5.83 percent farmers had more than 7 (large category) dairy animals in their herd. The contribution of indigenous cows in herd was more as compared to buffalo and crossbred cows

4.2.5 Milk Production

The table 4.2 revealed that majority (51.67%) of the farmers herd fell in medium category of milk production, followed by 35.83 and 12.50 percent of the farmers belonged to low and high categories of milk production, respectively.

4.2.6 Milk Consumption

From the milk consumption data, depicted in table 4.2 it could be observed that majority (53.33%) of the farmers were in low category of milk consumption, 41.67 percent were in medium category of milk consumption and 5.00 per cent were in high category of milk consumption.

4.2.7 Milk Sale

A cursory look at the milk sale data in the table 4.2 indicates that majority (69.17%) of the farmers were not selling milk, 20.00 per cent farmers were in

medium category of selling milk (3-6 litres/day) and 7.50 per cent were in high category of selling milk.

4.2.8 Milk Disposal Pattern

The result in the table 4.2 indicates that 69.17 percent of the respondents were not selling milk, 25.00 percent of the respondents were selling milk directly to consumer, followed by 5.00 percent who were selling milk to cooperative, only 0.83 percent were selling milk to hotel or halwai and none of the respondents were selling milk to middlemen

Table 4.3 Communication behaviour of the farmers

S. No.	Variables	Respondents (n = 120)	
		Frequency	Percentage
14.	Mass Media Exposure		
	Low (< 2)	66	55.00
	Medium (2 – 4)	43	35.83
	High (>4)	11	9.17
15.	Extension Agency Contact		
	Low (<2)	73	60.83
	Medium (2–3)	37	30.83
	High (>3)	10	8.34

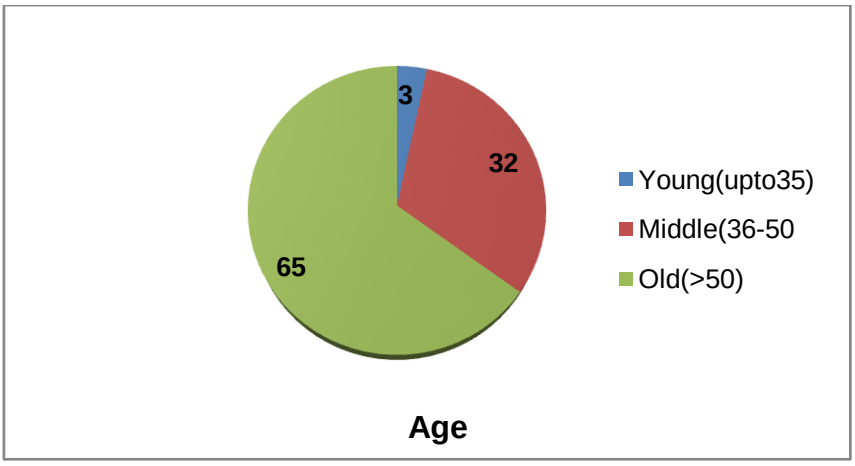
4.3.1 Mass Media Exposure

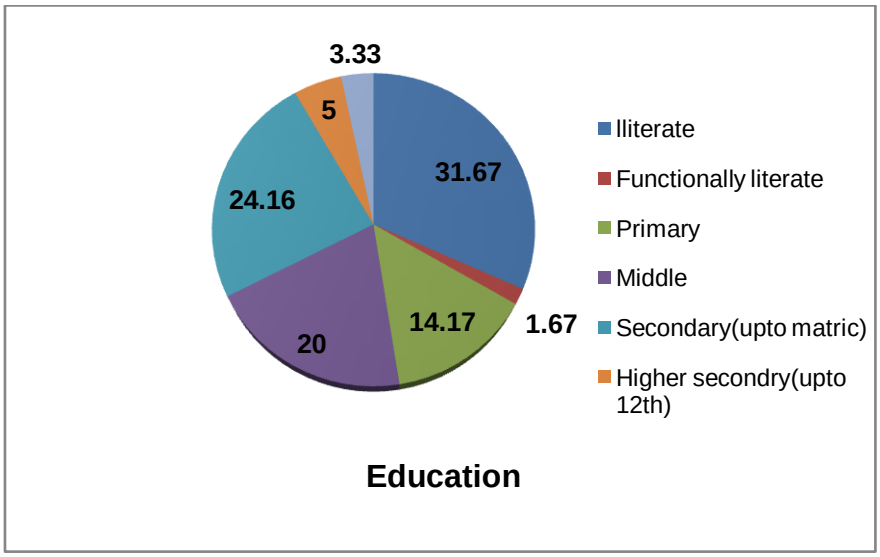
The mass media exposure of majority of the farmers in the study area was low (55.00%). However 35.83 percent respondents were in medium category of mass media exposure and 9.17 percent were in high category of mass media exposure. (Table 4.3)

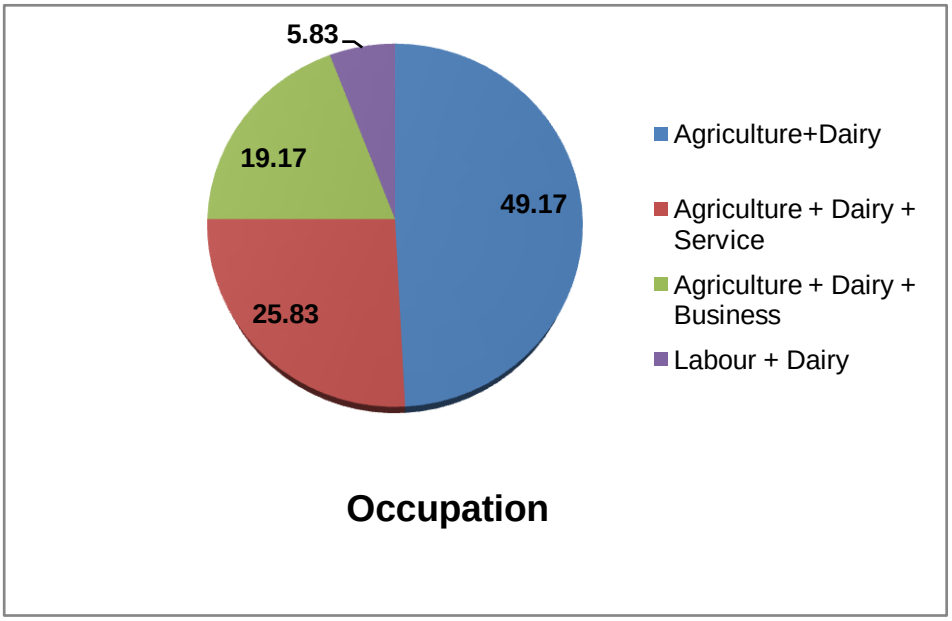
4.3.2 Extension Contact

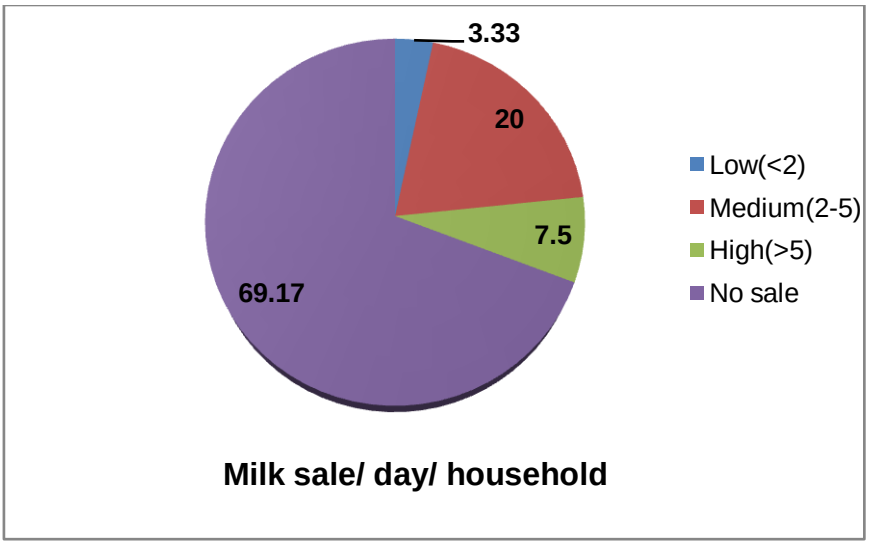
Table 4.3 shows that majority (60.83%) of the farmers had low extension contact, 30.83 percent were in medium category of extension contact and 8.34 were in

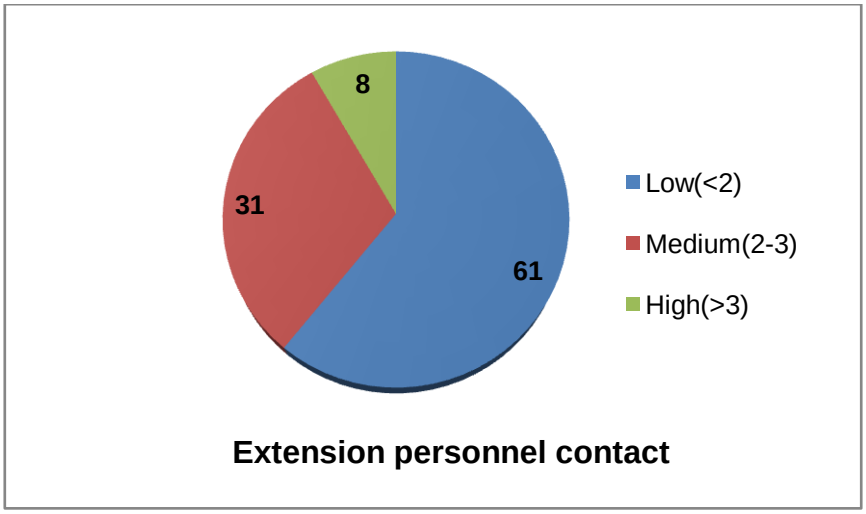
Graphical presentation of respondent's profile (percentage)

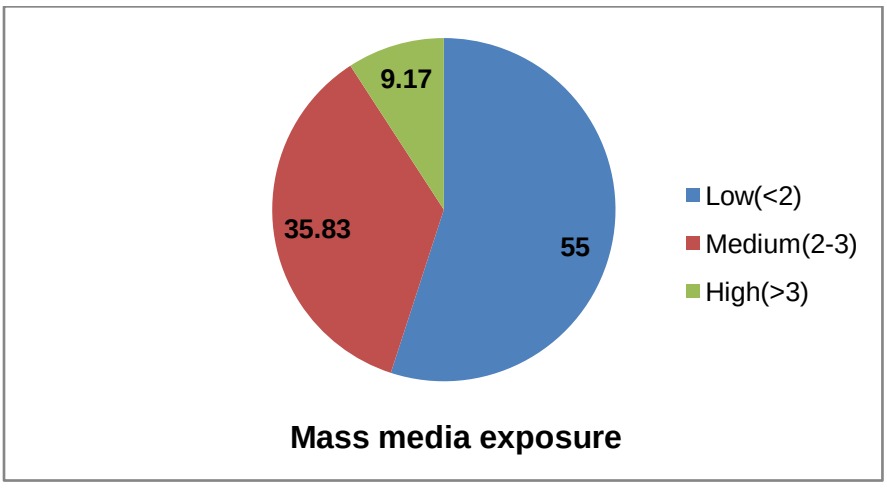


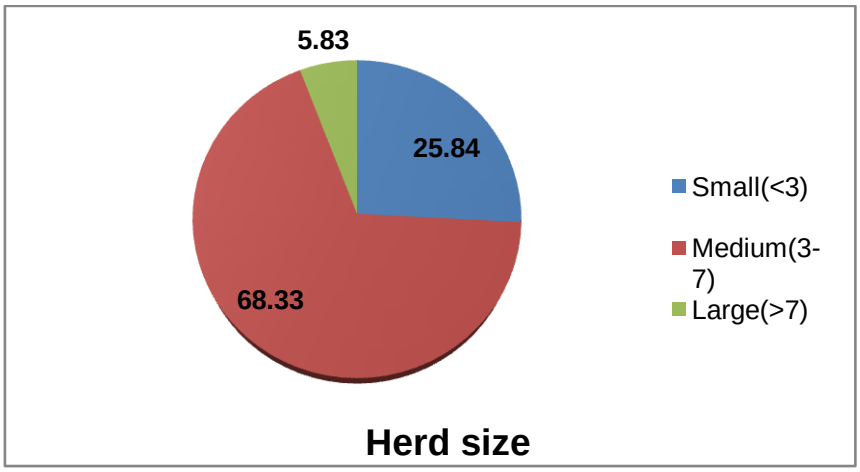


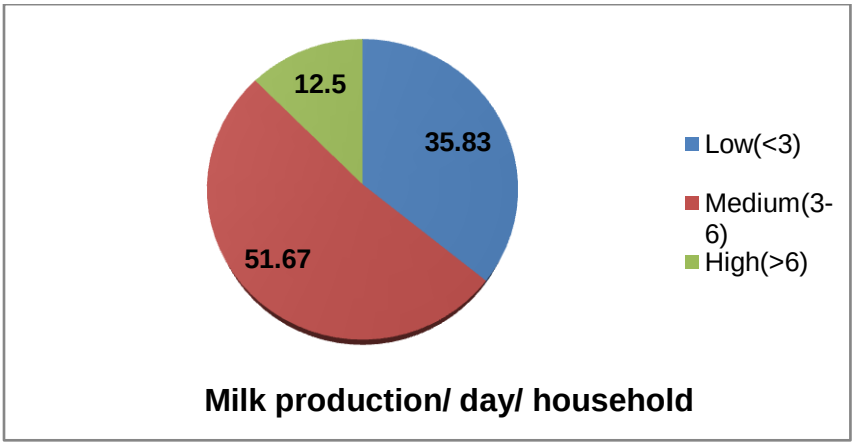


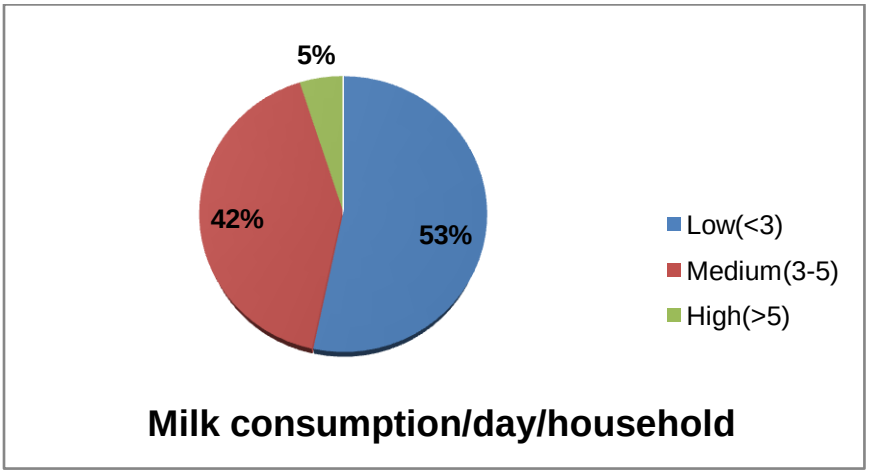

3.33
20
7.5
69.17
Low(<2)
Medium(2-5)
High(>5)
No sale
Milk sale/ day/ household


8
31
61
Low(<2)
Medium(2-3)
High(>3)
Extension personnel contact


9.17
35.83
55
Low(<2)
Medium(2-3)
High(>3)
Mass media exposure


5.83
25.84
68.33
Small(<3)
Medium(3-7)
Large(>7)
Herd size


12.5
35.83
51.67
Low(<3)
Medium(3-6)
High(>6)
Milk production/ day/ household


5%
42%
53%
Low(<3)
Medium(3-5)
High(>5)
Milk consumption/day/household

high category of extension contact. The reach of extension contact to remote villages of J&K were found to be low.

4.2 DISTRIBUTION OF RESPONDENTS ACCORDING TO HERD SIZE

Table 4.4: Age wise distribution of respondents according to herd size

Age of respondents (years)	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	F	%
Young (upto 35)	0	00.00	3	03.66	1	14.28
Middle (35-50)	13	41.94	22	26.83	3	42.86
Old (>50)	18	58.06	57	69.51	3	42.86

The table 4.4 shows that majority (58.06%) of the respondents having small herd were in old age group and 41.94% of the respondents having small herd were in middle age group. Majority (69.51%) of the respondents having medium herd were in old age group, 26.83% of the respondents having medium herd were in middle age group and 3.66% of the respondents were in young age group. 42.86% and 42.86% of the respondents having large herd were in old and middle age group respectively and 14.28% of the respondents having large herd were in young age group.

Table 4.5: Education wise distribution of respondents according to herd size

Education	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Illiterate	10	32.26	26	31.71	2	28.57
Functionally literate	2	06.45	0	00.00	0	00.00
Primary	3	09.68	14	17.07	0	00.00
Middle	4	12.90	19	23.17	1	14.29
Secondary	11	35.48	16	19.51	2	28.57
Higher Secondary	0	00.00	4	04.87	2	28.57
Graduate and above	1	03.23	3	03.67	0	00.00

A cursory look on table 4.5 shows that among the respondents having small herd size 35.48% were educated upto secondary level, 32.26% were illiterate, 12.90% were middle pass, 9.68% were educated upto primary level and 6.45% were functionally literate. Among the respondents having medium herd size 31.71% were illiterate, 23.17% were middle pass, 19.51% were educated upto secondary level, 17.07% were primary pass, 4.87% and 3.67% were educated upto higher secondary and graduate and above categories respectively. Among the respondents having large herd size 28.57 % were illiterate, 28.57% were educated upto secondary level and 28.57% were educated upto higher secondary level and 14.29% were middle pass.

Table 4.6: Social participation wise distribution of respondents according to herd size

Social participation	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Low (<1)	16	51.61	38	46.34	5	71.43
Medium (1-2)	13	41.94	37	45.12	2	28.57
High (>2)	2	06.45	7	08.54	0	00.00

The study revealed that among respondents having small sized herd majority (51.61%) were in low category of social participation, 41.94 percent and 6.45 percent were in medium and high category of social participation respectively. Among respondents having medium sized herd 46.34 percent were in low category of social participation followed by 45.12 percent and 8.54 percent in medium and high category respectively. Among respondents having large herd size majority (71.43%) were in low category followed by 28.57 percent in medium category of social participation. The respondents with large herd size were observed to have low social participation.

Table 4.7: Land holding wise distribution of respondents according to herd size

Land holding (ha)	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Landless (0)	2	06.45	2	02.44	0	00.00
Marginal (<1)	15	48.38	37	45.12	6	85.71
Small (1-2)	13	41.94	33	40.24	1	14.29
Semi-medium (2-4)	0	00.00	8	09.76	0	00.00
Medium (4-10)	1	03.23	2	02.44	0	00.00
Large (>10)	0	00.00	0	0.00	0	00.00

The study revealed that among respondents having small herd size 48.38% were marginal farmers, 41.94% were small farmers, 6.45% were landless and 3.23% were medium farmers. Among respondents having medium herd size 45.12% were marginal farmers, 40.24% were small farmers, 9.76% were semi-medium farmers, 2.44% were medium farmers and 2.44% were landless farmers. Among respondents having large herd size 85.71 were marginal farmers and 14.29% were small farmers.

Table 4.8: Milk production wise distribution of respondents according to herd size

Milk production (litre/day/household)	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Low (<3)	23	74.19	20	24.39	0	00.00
Medium (3-6)	8	25.81	54	65.85	0	00.00
High (>6)	0	00.00	8	09.76	7	100.00

The results in the table 4.8 shows that among respondent having small herd size majority (74.19%) were producing low quantity of milk, 25.81% producing medium quantity of milk. Among respondents having medium sized herd majority (65.85%) were producing medium quantity of milk and 24.39% low quantity of milk. Among respondents having large herd size majority (100.00%) producing high quantity of milk. A progressive increase in milk production as per the size of the herd was thus observed in the study.

Table 4.9: Milk consumption wise distribution of respondents according to herd size

Milk consumption (litre/day/household)	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Low (<3)	23	74.19	0	00.00	0	00.00
Medium (3-5)	8	25.81	79	96.34	3	42.86
High (>5)	0	00.00	3	03.66	4	57.14

Among respondents having small sized herd majority (74.19%) were consuming low quantity of milk and 25.81% consuming medium quantity of milk. Among respondents having medium sized herd majority (96.34%) were consuming medium quantity of milk and 3.66% consuming high quantity of milk. Among respondents having large herd size majority (57.14%) were consuming high quantity of milk followed by 42.86% consuming medium quantity of milk. (Table 4.9) The fact that families of respondents having small herd size are consuming

less than 3 lit/day shows that milk is contributing to nutritional security of this class which is quite encouraging.

Table 4.10: Milk sale wise distribution of respondents according to herd size

Milk sale (litre/day/household)	Small herd size (n= 31)		Medium herd size (n=82)		Large herd size (n=7)	
	f	%	f	%	f	%
Low (<3)	29	93.55	58	70.73	0	00.00
Medium (3 -6)	2	06.45	22	26.83	0	00.00
High (>6)	0	00.00	2	02.44	7	100.00

The results in the table 4.10 shows that among respondents having small sized herd majority (93.55%) were selling low quantity of milk and 6.45% selling medium quantity of milk. Among respondents having medium sized herd majority (70.73%) were selling low quantity of milk and 2.44 per cent selling high quantity of milk. Among respondents having large herd size majority (100.00%) were selling high quantity of milk. The sale of milk was found increasing as per the herd size.

Table 4.11: Mass media exposure wise distribution of respondents having small sized herd

Mass Media Exposure (Small herd size n=31)	Mostly (3)		Often (2)		Sometimes (1)		Never (0)	
	f	%	f	%	f	%	f	%
Radio	12	38.71	4	12.90	15	48.39	0	00.00
Television	0	00.00	6	19.35	8	25.81	17	54.84

Among various sources of mass media exposure, the respondents were using only radio and television only. So distribution of radio and television is shown in above table. The results in the table 4.11 revealed that 48.39 percent of respondents having small sized herd listened radio sometimes, followed by 38.71 percent listened radio mostly and 12.90 percent listened radio oftenly. Among

respondents having small sized herd majority (54.84%) of the respondents never watched television, followed by 25.81 percent and 19.35 percent watched television sometimes and oftenly respectively. The mass media exposure of respondents with small herd size was mostly limited to radio only. Television is yet to find a significant place in these remote villages of J&K.

Table 4.12: Mass media exposure wise distribution of respondents having medium sized herd

Mass Media Exposure (Medium sized herd n=82)	Mostly (3)		Often (2)		Sometimes(1)		Never (0)	
	f	%	f	%	f	%	f	%
Radio	18	21.95	9	10.98	54	65.85	1	01.22
Television	1	01.22	7	08.54	26	31.71	0	58.53

The results in the table 4.12 revealed that 65.85 percent of the respondents having medium sized herd listened radio sometimes, 21.95 percent listened radio mostly, 10.98 percent listened radio oftenly and 1.22 percent had never listened radio. 58.53 percent of the respondents never watched television, 31.71 percent watched television sometimes, 8.54 percent watched television sometimes and 1.22 percent watched television mostly. The mass media exposure of respondents with medium herd size mostly limited to radio only.

Table 4.13: Mass media exposure wise distribution of respondents having large sized herd

Mass Media Exposure (Large sized herd n=7)	Mostly (3)		Often (2)		Sometimes(1)		Never (0)	
	f	%	f	%	f	%	f	%
Radio	0	0.00	1	14.29	6	85.71	0	00.00
Television	0	0.00	0	00.00	1	14.29	6	85.71

The results in the table 4.13 revealed that 85.71 percent of respondents having large sized herd listened radio sometimes followed by 14.29 percent listened radio oftenly. 85.71 percent of the respondents never watched television followed by 14.29 percent sometimes watched television. The respondents with large herd size were observed to use radio sometimes but use of television was very limited.

Table 4.14: Extension contact wise distribution of respondents having small herd size

Extension contact (Small herd size) (n=31)	Never (0)		Half yearly (1)		Monthly (2)		Fortnightly (3)		Weekly (4)	
	F	%	f	%	f	%	f	%	f	%
VDO	19	61.29	11	35.48	1	03.23	0	00.00	0	00.00
VO	26	83.87	5	16.13	0	00.0	0	00.00	0	00.00
BDO/ADO	11	35.48	11	35.48	7	22.58	1	3.23	1	3.23
VLDA/ Stockman	28	90.32	1	9.68	0	0.00	0	0.00	0	0.00

The results in the table 4.14 shows 61.29 percent respondents having small sized herd had never visited VDO, 35.48 percent visited half yearly, and 3.32 visited monthly. 83.87 percent respondents having small herd size had never visited VO followed by 16.13 percent visited half yearly. 35.48 percent respondents having small herd size had never visited BDO/ADO followed by 35.48 percent who visited once in 6 months and 22.58 percent who visited monthly. 90.32 percent

respondents having small sized herd had never visited VLDA/Stockman followed by 9.68 percent who visited half yearly.

Table 4.15: Extension contact wise distribution of respondents having medium herd size

Extension contact (Medium herd size) n= 82	Never (0)		Half yearly (1)		Monthly (2)		Fortnightly (3)		Weekly (4)	
	F	%	f	%	f	%	f	%	f	%
VDO	51	62.19	29	35.37	0	00.00	0	00.00	2	02.44
VO	73	89.02	9	10.98	0	00.00	0	00.00	0	00.00
BDO/ADO	26	31.71	35	42.68	19	23.17	2	02.44	0	00.00
VLDA/ Stockman	73	89.02	9	10.98	0	00.00	0	00.00	0	00.00

The results in the table 4.15 shows 62.19 percent respondents having medium sized herd had never visited VDO, 35.37 percent visited one in 6 months, and 2.44 visited them weekly. 89.02 percent respondents having medium herd size had never visited VO followed by 10.98 percent visited half yearly. 42.68 percent respondents having medium herd size had visited BDO/ADO half yearly, 31.71 percent never visited BDO/ADO followed by 23.17 percent visited monthly and 2.44 percent visited fortnightly. 89.02 percent respondents having medium sized herd had never visited VLDA/Stockman followed by 10.98 percent who visited once in 6 months.

Table 4.16: Extension contact wise distribution of respondents having large herd size

Extension contact (Large herd size) n=7	Never (0)		Half yearly (1)		Monthly (2)		Fortnightly (3)		Weekly (4)	
	f	%	f	%	f	%	f	%	f	%
VDO	4	57.14	3	42.86	0	0.00	0	0.00	0	0.00
VO	7	100.00	0	0.00	0	0.00	0	0.00	0	0.00
BDO/ADO	2	28.57	4	57.14	1	14.29	0	0.00	0	0.00
VLDA/ Stockman	7	100.00	0	0.00	0	0.00	0	0.00	0	0.00

The results in the table 4.16 shows that 57.14 percent respondents having large sized herd had never visited VDO, 42.86 percent visited VDO once in 6 months. 100.00 percent respondents having large herd size had never visited VO. According to 57.14 percent respondents having large herd size had visited BDO/ADO who visited once in 6 months, 28.57 percent never visited BDO/ADO followed by 14.29 percent who visited them monthly. According to 100.00 percent respondents having large sized herd they had never visited VLDA/Stockman. It is noteworthy that there is very low extension contact among respondents having large herd size. Majority of the respondents had never visited veterinary officer (VO) which shows that respondents of the study area are dependent upon indigenous practices to cure their animals.

4.2 DOCUMENTATION OF ITK PREVALENT IN DAIRY FARMING

Documentation of ITKs was done through Focus Group Discussion with the farmers of the study area (Fig: 4.3) Through Focus Group Discussion, it was revealed that the farmers of study area were having deep knowledge regarding indigenous practices in various areas of breeding, feeding and health care practices and such practices were documented using semi-structured interview schedule and observation.

4.2.1 BREEDING PRACTICES

a) To induce heat

1. 250 g gurh (*Saccharum officinale*) and 150 gm ghee were mixed in wheat flour (*Triticum aestivum*) and then chapatti of this mixture was fed to animal once a day to induce heat in animal.
2. 1 kg methi (*Trigonella foenum-graecum*) grains were boiled and fed empty stomach to animals for 5 days to induce heat.

b) For removal of retained placenta

1. $^1/_2$ kg of tea leaves (*Camellia sinensis*) were boiled and extract was sieved and left liquid part was fed to affected animals.
2. $^1/_2$ kg dhan was boiled and fed to animal.
3. 1 kg stem of simbal (*Bombax ceiba*) tree and 100 g of jaggery (*Saccharum officinarium*) was boiled in half litre of water and fed to affected animals.
4. Cold water was fed to animals untill full stomach. Affected animals shed placenta within 10 minutes.
5. $^1/_2$ kg gulkand and 4 unboiled eggs was fed to the affected animals.
6. Desi channi (flour seiver) made of goat skin was ground and mixed in flour and fed to affected animals.
7. Baans leaves (*Bambusa arundinacea)* were fed to animal suffering from retained placenta.
8. 200 g wheat flour (*Triticum aestivum*) boiled in water and mixed in 100 g ghee and 100 g gurh (*Saccharum officinarium*). This mixture was applied on body of animal suffering from retension of placenta.

Photo 4: Simbal (*Bombax ceiba*)

Photo 5: Massa (*Bulbostylis barbata*)

a) Abortion

1. 250 g of gurh (*Saccharum officinarium*) and 150 g of ghee added in feed and fed to affected animals twice a day.
2. 350 g of gurh (*Saccharum officinarium*) and wheat flour were mixed with khal (roughage of sesame oil) of til oil (*Sesamum indicum*) and 150 g of this mixture was fed to animals twice a day for 8-10 days.

4.2.1 FEEDING PRACTICES

1. 1 kg Berseem (*Trifolium alexandrinum*), $^1/_2$ kg makki (*Zea mays*), $^1/_2$ kg bajra (*Pennisetum glaucum*) and 50 ml til oil (*Sesamum indicum*) was fed to animal once a day. It also increases the milk yielding potential of animals.
2. 1 kg massa (cut into pieces) (*Bulbostylis barbata*) was mixed in wheat flour and fed to animal to increase milk production.
3. Leaves of Khajur (Phoenix dactylofora) were fed to animals. It increases the ghee content of milk and milk production also.
4. 150 g of Mija khand (Red sugar made of desi gur) mixed in dry flour and given to animal once a day.
5. Baer leaves (*Ziziphus mauritiana*) were boiled and fed to animal once a day to increase milk production.
6. 200 g of Giloe/Garoh (*Tinospora cordifolia*) was ground and fed to animals once a day. It increases the milk production in cows and buffaloes and also removes general weakness in animals and make them healthy.
7. Fruits of bill (*Aegle marmelos*) tree were given to animals once a day to increase milk production and vigour of male buffaloes.
8. Garna leaves and shoots (*Carissa opaca)* were fed to increase milk yield in goats.
9. Til seeds (*Lens culinaris*) were fed to animal for increasing milk yield once a day.

Photo 6: Khajur *(Phoenix dactylofora)*

Photo 7: Baer leaves (*Ziziphus mauritiana*)

Photo 8: Garoh (*Tinospora cordifolia*)

Photo 9: Aloe vera (*Aloe Barbadensis*)

4.2.1 HEALTH CARE PRACTICES

a) Indigestion

1. Fruits of goon tree (*Aesculus indica*) were fed to the animal's suffering from indigestion.
2. Kuargandal (*Aloe vera*) was fed to animal if animal stopped taking food, while its fleshy leaves were fed to animals in case of indigestion.
3. Leaves of haedma (*Cassia occidentalis*) were ground and boiled and the decoction was given to the animal suffering from indigestion.

b) Diarrhoea

1. 100 g of Bana leaf (*Vitex negundo*) and 100 g of gurh (*Saccharum officinarium*) were ground and mixed with 100 g of Ajwain (*Trachyspermum ammi*) and mixture was given to animal twice a day for 2 days. It will cure the animal within 2 days.
2. Flowers of tobacco (*Nicotina tabacum*) were mixed in wheat flour and fed to animal once a day.
3. Rada (*Xeromphis spinosa*) was cut into pieces and mixed in wheat flour and mixture was fed to animal suffering from diarrhoea.
4. 10-12 leaves of Katori (*Xylosona longifolium*) plant were fed to animal having diarrhoea.
5. Fruits of bill (*Aegle marmelos*) were fed to animals having diarrhoea.

c) Constipation

1. 200-300g of Karangal (like stick, black in colour which is 1 feet long and 2 inch in diameter) (*Cassia fistula*) commonly called as 'Golden Shower Tree' was boiled in water. This mixture was given twice a day to affected animals till it cures.
2. Roots of vasak (*Adhatoda vasica*) were ground, boiled and the extract was fed to animals during constipation.
3. 100 g of Saunf (Foeniculum vulgare) was mixed in wheat flour and fed to animal once a day.
4. Flowers of gulab (*Rosa indica*) were fed to animal having constipation.

Photo 10: Bana plant (*Vitex negundo*)

Photo 11: Katori leaf (*Xylosona longifolium*)

Photo 12: Tobacco flowers (*Nicotina solanacae*)

Photo 13: Karangal/Amaltas (*Cassia fistula*)

a) Tympany

1. 250 g of kuargandal (*Aloe vera*) was given to animal. Outer layer of Aloe vera was peeled off and remaining portion was roasted in fire. To it, 200 g Ajwain (*Trachyspermum ammi*), 200 g of Kalajeera (*Cuminum cyminum*) and kala namak (*Black salt*) were added and ground and mixture was fed to animal once a day.
2. 10-15 Bana leaves (*Vitex negundo*) were grounded and fed to animal once a day.
3. $^{1}/_{2}$ kg spices of mango pickle was given to animal having constipation.
4. 1kg maize (*Zea mays*) was roasted and mixed in water and mixture was given to animal once a day.
5. 150 g of Hing (Ferula asafoetida) was given to animal once a day.
6. 1 litre of Mustard oil (*Brassica compertris*)was mixed with soda (*Sodium bicarbonate*) and water and drenched it to animal.
7. Leaves of 'Tulsi' (*Ocimum sanctum)* were given orally to cattle in case of tympany.
8. The old pickle of 'garghal' (*Citrus medica*) was fed to affected animal.

b) Dysentery

1. 150 gm Doodli (*Euphorbia hirta*) commonly called as 'Doodh ki jadi' was fed to animal once a day.
2. Water of boiled bark of 'simbal' tree (Bombax ceiba) was drenched to animals suffering from dysentery.

c) Fracture

1. Fomentation with ground Santha leaf (Dodonea viscosa) which was mixed in Maize flour and cow urine was done after cleansing the affected area.
2. Application of Til oil (*Sesamum indicum*) on the affected part after fixing it with bamboo splints (*Bambusa auriculata*).

d) Ulcer

1. Leaves of Banana tree (*Musa paradisiaca*) were ground and its juice was given to the animal twice a day.
2. Butter with chapatti was given to animal.

Photo 14: Doodli (*Euphorbia hirta*)

Photo 15: Santha leaf *(Dodonea viscosa)*

a) Foot and Mouth Disease (FMD)

1. 1 kg Amla, 'Indian goose berry' *(Emblica officinalis)* and piece of iron were boiled in water. When this suspension was cooled down, it was applied on the feet of affected animal.
2. 500 g of Giloe/Garoh (*Tinospora cordifolia*) was ground and given twice a day.
3. The oil from the seeds of the sarsoon (*Brassica compestris*) plant after mixing with Haldi powder (*Curcuma longa*) and kerosene oil was applied externally on the foot in case of animals suffering from FMD. The left over part of the seed, after the extraction of oil, commonly called as 'sarsoon ke khal' was mixed with water and was fed to the animal so that its mouth gets opened during FMD disease and was also given to remove general weakness and to increase milk yield.
4. Leaves and fruit of 'kela' *(Musa paradisiaca)* were ground and mixture was fed to animal suffering from FMD.
5. Affected animals were forced to walk on hot sand for 10-15 minutes.
6. Extract from the stem of deodar (*Cedrus deodara*) tree was applied externally to cure FMD.

b) Wound

1. Methi seeds (*Trigonella foenum – graceum*) were mixed with til oil (*Sesamum indicum*) and applied on the affected part.
2. Affected area was wrapped with horse faeces, til oil (*Sesamum indicum*) and sheep wool.
3. Paste of baryaan (*Acorus calamus*) rhizome was applied on open wound to prevent infection.

c) Sprain

1. Fomentation with santha leaf (*Dodonea viscosa*) dipped in metha oil and til oil (*Sesamum indicum*) was given to affected animal.

Photo 16: Banana tree (*Musa paradisca*)

Photo 17: Amla (*Phyllanthus officanalis*)

a) Respiratory diseases / disorders

a) Common cold, Fever and Cough

1. 150 g kali mirch (*Piper nigrum*), 150 g badi elaichi (*Cardamom*) and 150 g ajwain (*Trachyspermum ammi*) were ground and mixed with water and was fed to animal twice a day.
2. Blue colour cloth was burnt and its fumes were given to affected animals.

b) Pneumonia

1. $^{1}/_{4}$ kg of alsi (*Linum usitatissimum*) seeds were ground which was then mixed in wheat flour and given to animal once a day for 8 days
2. Leaves and flower of nikka ak shrub (*Calotropis procera*) were fed to animal once a day for 10 days.
3. Application of warm ghee on head and forehead of affected animals.

b) Poisoning

1. 2 kg massa (*Bulbostylis barbata*) was ground (root portion) and mixed with wheat flour and given to animal once a day till it cures.
2. 100 g Kali mirch (*Piper nigrum*) and 70 g kadwi zeeri (*Centratherum anthelminticum*) were mixed in 150 g ghee and mixture was fed to affected animals.
3. Jungli karela (*Momordica charantia*) was ground and given to animal once a day.
4. 150 g butter was given to animal with chapatti.
5. Itt-sitt (*Boerhavia diffusa*) plant was fed to animal in case if animal had consumed some poisonous weed.

c) Ectoparasites

1. 50 g common salt (Sodium chloride) was added to 250 g of sarsoon oil (*Brassica compestris*) and this solution was applied all over the body of animal.
2. 'Aaru' leaves (*Prunus persica*) were ground to form a paste, which was applied on the animal's body to remove external parasites.
3. 10 g of kerosene oil or petrol was applied all over the body of animal.

4. The oil extracted from the seeds of sarsoon plant was mixed with common salt and applied on the body of animal to remove external parasites.
5. 100 g mustard oil roughage (as it is bitter) was fed to animals.
6. 5-7 kg of taramira oil (*Eruca sativa*) was added to feed and mixture was fed to animal twice a day during march season in order to prevent animals from ectoparasitic infestation.
7. Shambar (*Artemisia nilagirica*) leaves were ground and applied on the body of animal for removing lice and other external parasites.
8. The decoction of neem (*Azadirachta indica*) leaves were applied all over the body of animal to remove external parasites.
9. Powdered form of leaves of tobacco (*Nicotiana tabacum*) were applied all over the body of animal to remove external parasites.

d) Endoparasites

1. Rhizome of baryaan herb (*Acorus calamus*) was fed to animals in order to remove internal parasites.
2. Shambar (*Artemisia nilagirica*) leaves were fed to animals for removing internal parasites.
3. Leaves of neem (*Azadirachta indica*) were ground and fed to animal to remove internal parasites.
4. The paste made after grinding the 'reetha' (Sapindus mukorossi) fruit was applied in the nostrils of cattle to remove leeches.

e) Pain / Stomach pain

1. 250 g each of ajwain (*Trachyspermum ammi*), bana leaves (*Vitex negundo*), and gurh (*Saccharum officinale*) were ground and homogenous mixture was formed which was given to animal twice a day.
2. Fruits of goon tree (*Aesculus indica*) were mixed in wheat flour and fed to animals suffering from stomach pain.
3. Fleshy leaves of kuargandal (*Aloe vera*) were fed to animals having stomach pain.
4. Leaves of taaye *(Woodfordia fruticosa)* plant were ground in the form of small tablets and fed to animal having stomach pain.

f) Burn

1. Leaves of 'Makora' grass (Cymbopogon martini) were ground and applied on the burn portion twice a day till it cures.

g) Haemorrhagic Septicaemia

1. 150 g butter was given along with feed for 8 days to animals suffering from H.S.
2. Oil extracted from the sarsoon seeds was orally given to animals to cure H.S.

h) Ephemeral fever

1. Leaves of 'amrood' or 'guava' tree (Psidium guajava) were ground and fed to the animals suffering from ephemeral fever.

i) Mastitis

1. 15 g black salt was applied on the teats once a day.
2. 10 g turmeric (*Curcuma longa*), 10 g alum or phitkari and 10 g black pepper were ground and massaged on teats once a day.

j) Eye related diseases

1. Leaves of bana (*Vitex negundo*) were ground and this paste was mixed with honey which was applied in eyes to cure eye infection or reddening of eyes in diseased animals.
2. Leaves of karangal (Cassia fistula) were crushed, mixed with honey and applied on eyes of animal suffering from conjunctivitis.
3. The paste prepared after grinding the 'sareen' seeds (*Albizia lebbeck*) was applied on red or infected eye of the animals.
4. The decoction of Tulsi (*Ocimum sanctum*) plant was mixed with honey and was applied in the eye to remove redness or extreme infection.
5. The extract of the kanth fruit (*Pyrus pashia*) was poured to the eyes of the animal suffering from eye infection.

k) Snake bite

1. Bulb of onion (*Allium cepa*) was fed to animal in case of snake bite.
2. Extract of imli (*Tamarindus indica*) was given to animal in case of snake bite.
3. Boiled tantara (*Oroxylum indicum*) seeds or its bark were fed to animals in case of snake bite.

Photo 18: Nikka ak (*Calotropis procera*)

Photo 19: 'Makora' grass *(Cymbopogon martini*)

a) Miscellaneous

1. Fruits of chilli (*Capsicum annuum*) along with other ingredients were given to the animal to cure helminthic infestation, and in powdered form these were externally applied on the bruised site of the animal after dog bite and also given to the animal suffering from cough.
2. Leaves of itt-sitt (*Boerhavia diffusa*) were boiled and decoction was applied on open wounds to cure skin diseases.
3. Fine stick of baans (*Bambusa arundinacea*) were used to prick blisters in mouth of affected animals.
4. Roots of sansporh (*Asparagus adscendens*) were grounded and the concoction was given orally to diseased animals to treat diarrhoea, blood in excreta, foot and mouth disease and ephemeral fever.
5. Roots of gidardar (*Cayratia trifolia*) were fed orally especially to ox, during dislocation of bones.
6. Extract from the stem of deodar (*Cayratia trifolia*) tree was applied externally to cure mange and broken horns.
7. Dried 'adrak' (*Zingiber officinale*) and fruits of goon tree (*Aesculus indica*) were fed during extreme winters to provide warmth to the body of animal's was fed to animals during excessive fall of temperature in winters.
8. Timru (*Zanthaoxylum armatum)* was fed to animal as appetizer while its bark and seeds cure blisters in mouth of affected animals.
9. 'Anar' (*Punica granatum*) was fed to animals to cure garmi (state of health in which animal doesnot eat anything).
10. Pulp and rhizome of banana (*Musa paradisiaca*), old garghal pickle and extract of imli (*Tamarindus indica*) were fed to animal in case of weed intoxication.

The indigenous practices documented are unique and indicated the rich knowledge possessed by the farmers of the study area. However, some of the ITKs documented is confirmatory with previous studies. Feeding 1 kg boiled methi gains (*Trigonella foenum-graecum*) to empty stomach animals for 5 days to induce heat are in line with the findings of Chand, (2011). Affected animals were forced to walk on hot sand for 10-15 minutes in case of FMD affected animals is

Photo 20: Tantara (*Oroxylum indicum*)

Photo 21: Sansporh (*Asparagus adscendens*)

in line with the findings of Srivastava (1982), Pandey (1996), Mandal (1999) and Jarial (2006). 1 litre of Similar finding i.e. Mustard oil (*Brassica compertris*)was mixed with soda (*Sodium bicarbonate*) and water and drenched it to animal in case of tympany was reported by Mandal (1999) and feeding ajwain, black salt and hing is confirmatory with earlier studies reported by Srivatava (1982) and Pandey (1996). Leaves of neem (*Azadirachta indica*) were ground and fed to animal to remove internal parasites is in confirmatory with the findings reported by Mandal (1999) and Seeralan (2004).

4.4 SELECTION OF MOST COMMONLY USED ITKs

Two ITKs each from Diarrhoea, Tympany and Pneumonia were selected based on their degree of use throughout the region under study. The scores given by the farmers on five point continuum ranging from least to highly suitable were tabulated. Then the scores were subjected to one way of analysis (ANOVA) for finding out variability between different alternatives (MVD, ITK-1 and ITK-2). For significant alternatives only, Duncan's Multiple Range Test (DMRT) was done to test the significant difference of means between different attributes of each group and to identify the best practice among them.

The ITKs were validated by the farmers in terms of effectiveness, side effects, cost effectiveness, availability, quickness in healing and ease in preparation.

4.5 VALIDATION OF SELECTED ITKS USING QUIK METHOD

4.5.1 Validation of indigenous practices for diarrhoea treatment

Indigenous practices i.e. Ground mixture of 100 g Bana+ 100 gm ajwain fed to animal and Tobacco flowers mixed in wheat flour fed to animal once a day used for diarrhoea treatment were selected for validation based on their degree of use throughout the region under study. (Table 4.17)

Table 4.17 Indigenous Practices for treatment of Diarrhoea

S.No.	Indigenous practices	F	%
1.	100 gm of Bana leaf (*Vitex negundo*) and 100 gm of gurh (*Saccharum officinarium*) is grounded and mixed with 100 gm of Ajwain (*Trachyspermum ammi*) and mixture is given to animal twice a day for 2 days. It will cure the animal in 2 days.	63	52.5
2.	Flowers of tobacco (*Nicotina solanacae*) are mixed in wheat flour which is given to animal once a day.	32	26.67
3.	10-12 leaves of Katori (*Xylosona longifolium*) plant are fed to animal having diarrhoea.	9	7.5
4.	Rada (*Xeromphis spinosa*) is cut into pieces and mixed in wheat flour and mixture is fed to animal suffering from diarrhoea.	11	9.17
5.	Fruits of bill (*Aegle marmelos*) are fed to animal having diarrhoea.	5	4.16

Validation on different alternatives used for tympany treatment:

- Modern Veterinary Drug;
- ITK-1: Ground mixture of 100 g Bana+ 100 gm ajwain fed to animal
- ITK-2: Tobacco flowers mixed in wheat flour fed to animal once a day.

Table 4.18 Analysis of variance (M.S.S value) of different alternatives (MVD, ITK-1 and ITK-2) for Diarrhoea

ANOVA				
Source of Variation	*SS*	*df*	*MS*	*F*
Between Groups	28.15556	2	14.07778	**13.52337****
Within Groups	90.56667	87	1.040996	
Total	118.7222	89		

F critical = 4.85777, **Significant at 1% level of significance

The results in the table 4.17 shows that all the alternatives used for the treatment of diarrhoea differed significantly ($p \leq 0.01$) with each other. So to identify the best practice among them Duncan's Multiple Range Test was done

Table 4.19 Duncan's Multiple Range (DMRT) to find difference of means among different alternatives for diarrhoea

Mean ± S.E. (n=30)

Alternatives / Attributes	MVD	ITK-1	ITK-2
Effectiveness	4.36±0.089^{a}	3.7±0.097^{b}	2.86±0.114^{b}
Side effects #	4.46±0.0926^{a}	1.6±0.090^{d}	2.03±0.075^{c}
Cost effective	2.06±0.046^{c}	4.7±0.085^{a}	4.56±0.092^{a}
Availability	2.53±0.104^{c}	4.53±0.092^{a}	4.4±0.090^{a}
Quickness in healing	4.16±0.069^{ab}	3.4±0.113^{bc}	2.66±0.099^{bc}
Ease in preparation	3.56±0.123^{b}	2.8±0.101^{c}	2.86±0.079^{b}

abc means Dissimilar superscript which indicates significant ($P \leq 0.01$) difference of mean

High value means more side effects

A cursory look on Table 4.18 shows that MVD and both ITKs differed significantly ($p \leq 0.01$) with each other regarding effectiveness in case of diarrhoea. The MVD was most effective (4.36±0.089) in this regard among all the alternatives, whereas, ITK-1 was slightly more effective as compared to ITK-2. Use of both the ITKs was highly cost effective over MVD. As far as quickness in healing was concerned, MVD rendered the healing process most quickly, followed by ITK-1 and ITK-2. As such, between the two ITKs studied for diarrhoea treatment, ITK-1 (Mixture of Bana leaves+ ajwain) was more effective as compared to ITK-2 (Tobacco flowers mixed in wheat flour). About ease in preparation, MVD was found in readymade form, whereas, in case of ITKs, the farmers had to collect the ingredients first, then to process and apply it. For this reason, MVD might be easier to prepare than ITKs. MVD was perceived to be having more side effects than the ITK-1 and ITK-2. ITK-1 was having least side effects. In terms of availability, both the ITKs were rated better than MVD. This might be due to the fact that MVD was not easily accessible, whereas, ingredients of ITKs were locally available and easily accessible to the farmers.

Although MVD recorded higher ranking in criteria like effectiveness, quickness in healing and ease in preparation, the critical perusal of the data revealed that the farmers, keeping all the six criteria in view favourably accepted the ITK-1 and ITK-2. Among both ITKs, ITK-1 i.e. Ground mixture of 100 g bana leaves + 100 g ajwain was perceived to be superior and most commonly used by the farmers for diarrhoea treatment. The viable alternative on the basis of available criteria seemed to be the indigenous technical knowledge from the farmer's perspective.

4.5.2 Validation of indigenous practices used for tympany treatment

Indigenous practices i.e. Grounded mixture of 250 g of Aloe vera+ 200 g of ajwain+ 200 g of kalijeera and kalanamak were given to animal once a day and Grounded mixture of 10-15 Bana leaves were given to animal once a day for tympany treatment were selected for validation based on their degree of use throughout the region under study. (Table 4.20)

Table 4.20 Indigenous practices for treatment of tympany

S.No.	Indigenous practices	f	%
1.	250 gm of kuargandal/Aloe vera (*Aloe barbadensis*) is given to animal. Outer layer of Aloe vera is peeled off and remaining portion is roasted in fire. To it, 200 gm Ajwain (*Trachyspermum ammi*), 200 gm of Kalajeera (*Cuminum cyminum*) and kala namak (*Black salt*) is added and grounded and mixture is fed to animal once a day.	52	43.34
2.	10-15 Bana leaves (*Vitex negundo*) are grounded and fed to animal once a day	31	25.84
3.	$^1/_2$ kg spices of mango pickle is given to animal having constipation.	7	5.83
4.	1kg makki (*Zea mays*) is roasted and mixed in water and then given to animal once a day.	3	2.5
5.	150 gm of Hing (Ferula asafoetida) is given to animal once a day.	3	2.5
6.	1 litre of Mustard oil (*Brassica compertris*) is mixed with soda (*Sodium bicarbonate*) and water and drench it to animal.	4	3.33
7.	Leaves of 'Tulsi' (*Ocimum sanctum)* are given orally to cattle to cure tympany.	5	4.16
8.	The old pickle of 'garghal' (*Citrus medica*) is fed to affected animal. It is also given to animal which has consumed some poisonous weeds	15	12.5

Validation on different alternatives used for tympany treatment:

- Modern Veterinary Drug;
- ITK-1: Grounded mixture of 250 g of Aloe vera+ 200 g of ajwain+ 200 g of kalijeera and kalanamak were given to animal once a day ;
- ITK-2: Grounded mixture of 10-15 Bana leaves were given to animal once a day.

Table 4.21 Analysis of variance (M.S.S value) of different alternatives (MVD, ITK-1 and ITK-2) for Tympany

ANOVA				
Source of Variation	*SS*	*d.f*	*MS*	*F*
Between Groups	2.466667	2	1.233333	0.867889
Within Groups	123.6333	87	1.421073	
Total	126.1	89		

F critical = 4.85777

The results in the table 4.19 shows that all the alternatives (MVD, ITK-1 and ITK-2) used for the treatment of tympany were not differed significantly ($p \leq 0.01$) with each other i.e. there is no significant different difference between MVD, ITK-1 and ITK-2. Hence Duncan's Multiple Range Test was not followed for tympany alternatives.

4.5.3 Validation of indigenous practices used for Pneumonia treatment

Indigenous practices i.e. Ground seeds of $^1/_4$ kg alsi+ wheat flour was given to animal once a day for 8 days and Nikka ak leaves and flowers were given to animal once a day for 10 days for pneumonia treatment were selected for validation based on their degree of use throughout the region under study. (Table 4.22)

Table 4.22 Indigenous Practices for treatment of Pneumonia

S.No.	Indigenous practices	f	%
1.	$^1/_4$ kg of alsi (*Linum usitalissimum*) seeds are grounded which is then mixed in wheat flour and given to animal once a day for 8 days	62	51.67
2.	Leaves and flower of nikka ak shrub (*Calotropis procera*) are fed to animal once a day for 10 days.	37	30.83
3.	Application of warm ghee on head and forehead of affected animals.	21	17.50

Validation on indigenous practices used for treatment of pneumonia.

- Modern Veterinary Drug;
- ITK-1: Ground seeds of $^1/_4$ kg alsi+ wheat flour was given to animal once a day for 8 days;
- ITK-2: Nikka ak leaves and flowers were given to animal once a day for 10 days)

Table 4.23 Analysis of variance (M.S.S value) of different alternatives (MVD, ITK-1 and ITK-2) for Pneumonia

ANOVA				
Source of Variation	*SS*	*d.f*	*MS*	*F*
Between Groups	43.4888	2	21.74444	**22.86583****
Within Groups	82.7333	87	0.950958	
Total	126.222	89		

F critical = 4.85777 **Significant at 1% level of significance

The results in the table 4.20 shows that all the alternatives used for the treatment of diarrhoea differed significantly (p≤0.01) with each other. So to identify the best practice among them Duncan's Multiple Range Test was done

Table 4.24 Duncan's Multiple Range to find difference of means among different alternatives for Pneumonia

Mean ± S.E. (n=30)

Alternatives / Attributes	MVD	ITK-1	ITK-2
Effectiveness	4.13±0.063^{ab}	4.0±0.067^{b}	3.46±0.092^{b}
Side effects#	4.33±0.087^{a}	1.73±0.095^{d}	2.43±0.123^{c}
Cost effectiveness	1.76±0.078^{c}	4.56±0.092^{ab}	4.23±0.078^{a}
Availability	1.9±0.111^{c}	4.7±0.085^{a}	4.53±0.092^{a}
Quickness in healing	4.0±0.067^{ab}	3.93±0.046^{b}	2.96±0.122^{bc}
Ease in preparation	3.53±0.104^{b}	2.83±0.108^{c}	3.3±0.118^{b}

abc means Dissimilar superscript which indicates significant (P≤0.01) difference of mean

High value means more side effects

A cursory look on Table 4.21 shows that MVD and both ITKs differed significantly (p≤0.01) with each other in case of pneumonia. There was a significant difference in the effectiveness of ITK-1 (4.0±0.067) and ITK-2 (3.46±0.092) at 1% level whereas, MVD was slightly more effective as compared to ITK-1. Use of both the ITKs was highly cost effective over MVD. As far as quickness in healing was concerned, MVD and ITK-1 rendered the healing process most quickly, followed by ITK-2. As such, between the two ITKs studied for pneumonia treatment, ITK-1 (Ground seeds of alsi+wheat flour) was perceived to be more suitable as compared to ITK-2 (Nikka ak leaves and flowers) for pneumonia treatment. About ease in preparation, MVD was found in readymade form, whereas, in case of ITKs, the farmers had to collect the ingredients first, then to process and apply it. For this

reason, MVD might be easier to prepare than ITKs. MVD was perceived to be having more side effects than the ITK-1 and ITK-2. ITK-1 was having least side effects. In terms of availability, both the ITKs were rated better than MVD. This might be due to the fact that MVD was not easily accessible, whereas, ingredients of ITKs were locally available and easily accessible to the farmers.

Although MVD recorded higher ranking in criteria like effectiveness, quickness in healing and ease in preparation, the critical perusal of the data revealed that the farmers, keeping all the six criteria in view favourably accepted the ITK-1 and ITK-2. Among both ITKs, ITK-1 i.e. Ground seeds of $^{1}/_{4}$ kg alsi+ wheat flour was given to animal once a day for 8 days was perceived to be superior and most commonly used by the farmers for pneumonia treatment. Experience from discussions with the farmers further confirmed their belief in ITK-1 as the most viable alternative for pneumonia and used by the farmers as there is no veterinary dispensary/hospital in the villages and as they had full belief and trust that there animal will cure by ITK only.

Another important reason for favouring ITK was that all the ingredients used were available at their doorsteps or in village itself and such preparations were prepared by a group of villagers in a large amount so that they may provide it to a huge number of animals at the same time. The farmers prefer to use ITKs because they believe that this may lead to increase in immunity of the animals without any loss in the production capacity of animals.

The study revealed that there was a significant difference between MVD, ITK-1 and ITK-2 at 1 percent level of significance in all the six attributes viz., effectiveness, side effects, cost effectiveness, availability, quickness in healing and ease in preparation in relation to diarrhoea and pneumonia diseases in animals. The dairy farmers perceived ITK as more favourably accepted among the rural communities owing to its cost effectiveness, local availability in the flora and fauna of the village and lesser side effects.

Study for validation of indigenous practices (i.e Smoked *Pelakacha's* fruit; Juice of *Anaras* leaves and *Rakta kambal* + soda) for treatment of diarrhoea was reported by Amitendu (2004), Gupta and Nagarajan (2009).

4.6 FACTORS DETERMINING THE USE OF ITK BY RESPONDENTS

For the purpose of prioritizing the factors, Garret ranking has been used. After calculating the percent position of ranks of the already identified factors, transmutation of orders of merit was done following Garret (1981). The final ranking of the factors in order to fix their relative priority was done on the basis of their mean score.

Table 4.20 depicts that most important factor determining the use of ITK by the farmer's was its "availability". Indigenous plants in the study area were locally and easily available. This shows that ITK was easily accessible to the dairy farmers in local flora and fauna of the village or with the local healers.

The second important perceived factor was "farmers having deep knowledge of ITK". Farmers of the study area had deep knowledge about various indigenous practices in different areas of Breeding, Feeding and health care management. In addition to their knowledge, farmers had full faith that animal will cure by ITK only.

"Distant location of Veterinary hospital/dispensaries and non availability and high cost of Veterinary medicines" was perceived as the third important factor. There were no Veterinary dispensaries in the villages under study except few villages which was having only one dispensary and that too without any facilities. All dispensaries were 4-5 km away from the villages which left the farmers with the option of practicing indigenous practices for the treatment of their animals. In addition to it in a country like India, where most of the dairy farmers are resource poor, respondents felt that high cost of veterinary drugs hindered them from using drugs for treatment of animals.

Table 4.25 Final ranking of factors that determine the use of ITK by dairy farmers

S. No.	Factors	Mean score (Score/Frequency)	Rank
1.	Locally and easily available	71.22	I
2.	Farmers having deep knowledge of ITK	69.06	II
3.	Distant location of Veterinary hospital and non availability and high cost of Veterinary medicines	67.86	III
4.	Lesser side effects	53.85	IV
5.	ITK is farmer oriented and evolved by the farmer's	52.48	V
6.	ITKs are often cheaper i.e cost-effective	45.18	VI
7.	Lack of faith in modern medicine	44.94	VII
8.	ITK is compatible with local situation and easy to adopt	41.63	VIII
9.	ITK is less dependent on the use of external inputs	29.38	IX
10.	Lack of linkages and coordination among the various agencies	21.37	X

According to respondents "lesser side effects of ITK", ITK is farmer oriented and evolved by the farmer's", "cost-effectiveness", "lack of faith in modern medicine", "easy adoption and compatible with local situation", "less dependent on the use of external inputs" and lack of linkages and coordination among the various agencies were perceived as other factors that determine the use of ITKs by the dairy farmers. The reason for easy adoption and compatibility may be due to the fact that the ITK used by dairy farmers suits their beliefs, habits and traditional values and can be performed using available resources.

The dairy farmers had graded ITK as cost effective which may be due to the reason that all the ingredients used were available at their doorsteps or in village itself and secondly such preparations were prepared by a group of villagers in a large amount so that they may provide it to a huge number of animals at the same time.

The respondents were having lack of faith in modern medicine which may be due to the fact that experimental evidences performed since generations have led to development of an inspiration, an opinion or a statement of reasons which made the farmers to trust ITK more than veterinary medicine in treating their animals. ITK is less dependent on the use of external inputs as all the ingredients used in ITK were either available with the local healers or available locally.

Easy and local availability of indigenous plants, high cost of veterinary medicines, lesser side effects and mearge extension efforts is in line with the findings of Srivastava (1982), Pandey (1996), Mandal (1999) and Meena (2000).

CHAPTER - 5

Summary and Conclusion

5. SUMMARY AND CONCLUSIONS

India has a very rich heritage of traditional health control and treatment systems (Ayurvedic, Unani and Homeopathic) that have been used for animals since time immemorial. These practices have been percolating from one generation down to the next by oral transmission and considered to be the holistic approach for livestock management. The indigenous technical knowledge regarding animal husbandry is considered to be as old as domestication of various livestock species.

Modern veterinary care reaches to only 20% of livestock owners of the World and approximately $ 10 billion are lost annually on account of livestock diseases (Nair, 2005). The absence of adequate allopathic conventional health care systems forces remote communities throughout the world to rely on traditional medicines for their primary health care (WHO, 2002) and veterinary care (Schillhorn, 1997 and Martin *et al*., 2001). The indigenous practices are not only cost effective but are socially compatible and generally comprise of easily available local flora/ingredients (Das and Tripathi, 2009). In addition to this, indigenous medicines have almost no side effects. Moreover, with the studies such as of Waller (1997) who reported that the modern medicines are becoming less effective in treatment and controlling of veterinary diseases, it is becoming more and more important to rediscover our traditional wealth of indigenous knowledge.

Unfortunately, these practices, which are in vogue throughout rural India, are little documented and there is danger of extinction of this knowledge. Thus, it has become imperative to collect and document these practices and to assess their validity. The indigenous practices in the Kathua district are a part of rich traditions of animal care in India. J&K is a hilly state, lying in the lap of western Himalayas. The dwellers of this remote and hilly region of the Himalayas are dependent almost entirely on their traditional indigenous knowledge and traditional healers to cure their animals. So far as the indigenous practices of Jammu and Kashmir are concerned there are few reports (Beigh et al., 2003 and Rashid et al., 2007). Only one survey has been carried out in Kathua district regarding documentation of

ethnoveterinary plants prior to this study and the area is virgin in this context. Therefore, an attempt has been made to document and validate the indigenous practices related to livestock management in the Kathua district of J&K. The present study entitled, **"Study of Indigenous Technical Knowledge on Dairy Farming in Kathua District of J&K"** was conducted with following objectives:

i) To analyse the socio-economic profile of the respondents.
ii) To identify and document the Indigenous Technical Knowledge (ITKs) prevalent in dairy farming.
iii) To validate the selected ITKs related to dairy farming.
iv) To identify the factors that determines the use of ITKs.

5.1 RESEARCH METHODOLOGY

The present study was conducted purposively in Kathua district of the J&K. The Kathua district is having 8 blocks, out of which 3 blocks were selected randomly for the study and from each selected blocks, 2 villages were selected randomly. For the present study information was collected from 120 farmers, 20 from each selected village, who had at least one milch animal and those practicing ITK at the time of investigation. Beside this 30 farmers were selected for validation. Qualitative research methods i.e. Direct observation, Focus Group Discussion and Semi-structured interview schedule were used for documentation of ITKs and to gather information on most prevalent veterinary ailment for selection of ITKs. Quantitative research methods such as Analysis of variance (ANOVA), Duncan's Multiple Range Test (DMRT) and Garret Ranking Technique were used for validation of indigenous technical knowledge (ITKs) and for factors that determine the use of ITKs.

The data were collected personally through a semi structured interview schedule which was pretested among respondents from non sample area for elimination, alteration and modification. The data thus collected were compiled, tabulated and subjected to the appropriate statistical tools to draw meaningful conclusions.

5.2 SALIENT FINDINGS

5.2.1 Socio-economic profile of farmers

- Majority (68.33%) of the farmers were having medium herd size i.e. 3-7 animals.
- 41.67 per cent of the farmers had low level of income and 48.33 per cent of the farmers were categorized in the group of marginal land holding.
- Majority (51.67%) of the respondents reported medium milk production of their dairy herd.
- Majority (69.17%) of the respondents were not selling milk at all.

5.2.2 Documentation and selection of ITKs

- There were as many as 108 different ITK that were documented in the area of breeding ,feeding and health care practices.
- There were 12 ITKs for breeding. Among that feeding mixture of 250 g gur (*Saccharum officinarium*) and 150 g ghee mixed in wheat flour (*Triticum aestivum*) was most effective for inducing heat.
- There were 9 ITK for feeding. Among that massa (*Bulbostylis barbata*), khajur *(Phoenix dactylofora),* berseem, maize, bajra (Pennisetum typhoides), til oil and seeds, mijakhand, baer leaves, giloe (*Tinospora cordifolia*) were mostly fed by farmers.
- There were 87 ITKs for health care practices. Among that 'bana' leaves (*Vitex negundo*), 'tobacco' flowers (Nicotiana tabacum), 'rada' (*Xeromphis spinosa*), gurh, 'katori' (*Xylosona longifolium*) leaves and bill fruit (*Aegle marmelos*) were most commonly fed by farmers to animals affecting from diarrhoea.
- Karangal (*Cassia fistula*), Vasak (*Adhatoda vasica*), and saunf *(Foeniculum vulgare)* were fed to animals affecting from constipation whereas Kuargandal *(Aloe vera),* bana leaves, spices of mango pickle, maize, *mustard* oil mixed with soda were fed to animals affecting from tympany.
- Doodli (*Euphorbia hirta*) and boiled bark of simbal (Bombax ceiba) tree drenched to animal suffering from dysentery where as

fomentation with santha leaf (*Dodonea viscosa*) and application of til oil after fixing it with bamboo splints was carried out in fracture cases.

- Amla *(Emblica officinalis)*, Giloe (*Tinospora cordifolia*), deodar (*Cedrus deodara*) extract were fed to FMD affected animals where as juice of banana (*Musa paradisca*) leaves were given in case of ulcers.
- Mixture of Kali mirch (*Piper nigrum*), badi elaichi (*Cardamom*) and ajwain (*Trachyspermum ammi*) was given in case of common cold, fever and cough whereas ground alsi seeds (*Linum usitatissimum*) were fed in case of pneumonia.
- Ground 'massa' (*Bulbostylis barbata*), jungle karela (*Momordica charantia*), kali mirch (*Piper nigrum*) and kadwi zeeri (*Centratherum anthelminticum*) was fed in case of food poisoning.
- Ground leaves of 'makora' grass (Cymbopogon martini) was applied on the burn portion of affected animals whereas ajwain, fruits of goon (*Aesculus indica*), *Aloe vera* were fed to animals in case of pain/stomach pain.
- Butter along with feed and extracted sarsoon oil were orally fed to animals suffering from Haemorrhagic Septicaemia whereas ground leaves of guava *(Psidium guajava)* were fed to animals in case of ephemeral fever.
- Fruits of goon tree (*Aesculus indica*) and fleshy leaves of *Aloe vera* were fed to animals in case of indigestion
- Bulb of onion (*Allium cepa*), imli extract (*Tamarindus indica*) and boiled tantara (*Oroxylum indicum*) seeds were fed to animals in case of snake bite.
- Ground 'bana' leaves, ' karangal' leaves, 'sareen' seeds (*Albizia lebbeck*), and 'tulsi' (*Ocimum sanctum*) decoction mixed with honey and applied in the eyes of affected animals to cure eye related diseases.
- Concoction of ground roots of sansporh (*Asparagus adscendens*) were given orally to diseased animals to treat diarrhoea, blood in

excreta, foot and mouth disease and ephemeral fever whereas roots of gidardar (*Cayratia trifolia*) were fed orally especially to ox, during dislocation of bones.

- Dried 'adrak' (*Zingiber officinale*) and fruits of 'goon' tree (*Aesculus indica*) were fed to animals during excessive fall of temperature in winters whereas Anar' (*Punica granatum*) was fed to animals to cure garmi (state of health in which animal doesnot eat anything).
- Fruits of chilli (*Capsicum annuum*) along with other ingredients were given to the animal to cure helminthic infestation, and in powdered form these were externally applied on the bruised site of the animal after dog bite and also given to the animal suffering from cough.
- Timru (*Zanthaoxylum armatum)* was fed to animal as appetizer while its bark and seeds cure blisters in mouth of affected animals where as Pulp and rhizome of banana (*Musa paradisiaca*) and old garghal pickle was fed to animal in case of weed intoxication.
- Two ITKs each from Diarrhoea, Tympany and Pneumonia were selected based on their degree of use throughout the region under study for validation.

5.2.3 Validation of ITKs

- The selected ITKs validated were found to be effective against respective ailments. However, these were perceived to be comparatively less effective than the Modern Veterinary Drug (MVD) in numbers of animals cured and quickness in healing.
- The dairy farmers perceived ITK as more favourably accepted among the rural communities owing to its cost effectiveness, local availability in the flora and fauna of the village and lesser side effects.

5.2.4 Factors that determine the use of ITKs by dairy farmers

- Easy availability of indigenous plants, deep knowledge and trust regarding ITK, distant location of veterinary hospital/dispensaries, non availability and high cost of veterinary medicines were the main factors that determine the use of ITKs by the dairy farmers.

5.3 CONCLUSIONS OF THE STUDY

On the basis of findings of the present study, the following conclusions have been drawn.

- Majority of the respondents were having medium herd size and milk production.
- Farmers of the study area had deep knowledge regarding indigenous practices in different areas of Breeding, Feeding and Health care and about 108 indigenous practices in those areas were documented.
- The dairy farmers perceived ITK as more favourably accepted among the rural communities owing to its cost effectiveness, local availability in the flora and fauna of the village and lesser side effects.
- Easy availability of indigenous plants, deep knowledge and trust regarding ITK were the main factors that determine the use of ITKs by the dairy farmers.

5.4 IMPLICATIONS OF THE STUDY

This research contributes to knowledge on indigenous technical knowledge possessed by farmers of Kathua district of J&K, which is well known for its traditional culture and values. Based on the research findings, implications of this study can be summarized as follows:

- The present research study provides empirical evidence that the Kathua region is very rich in ITKs which are used by farmers for treatment of their animals. This needs immediate attention for experimental validation of these ITKs for identification and isolation of active ingredient present in them. Such studies will provide scientific rationality for use of ITKs in future. It has great bearing on development of herbal drugs for treatment of various ailments.
- Extension functionaries should give attention to the ITKs with high validity scores and having less expenditure and prompt availability as an alternative to Modern Veterinary Drug.
- The findings indicate that the study area has a lot of potential in its rich flora and fauna containing herbal plants used for preparation of

traditional medicines which calls for conservation of these rich resources and taking care of Intellectual Property Rights (IPRs).

- This research offers wide perspectives for understanding and documenting ITKs which needs attention of planners, policy makers and extension personnel.

5.5 RECOMMENDATIONS

- The government and non-governmental organizations must work to preserve herbs and provide necessary facilities to the farmers to cultivate these species.
- Other than this, they must also provide some monitory assistance to the traditional healers, so that we may conserve these rich traditions of animal care for our future generations.
- It is also the need of the hour to establish a Central apex body for the formulation of policies and programmes for identification of education and training needs to popularize the indigenous technical knowledge in India as well as to establish an linkage with organizations having experiences in ITK.

5.6 UTILITY OF THE STUDY

- The adoption of technology generated by National Agricultural Research System (NARS) is very limited which shows farmers are still adopting ITKs. Hence it is important to identify and preserve the ITKs to sustain the productivity and protect the ecosystem.
- Documentation and validation of ITKs will help the researches to select ITKs for experimental validation and isolation of active ingredients in the laboratories.
- The ITKs documented in this study will help the scientist's and farmers to use them to their best advantage.
- Documentation and validation of ITKs will contribute towards preservation of important herbs, plants and trees used for animal's treatment.

5.7 SUGGESTIONS FOR FUTURE RESEARCH

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

- Similar studies can be conducted in other areas of country to prepare a documentary of this authentic knowledge base.
- Research with domain of “Intellectual Property Rights on indigenous medicines used by farmers in the area of dairying” should also be incorporated.
- A research project could be formulated to validate the rationality of the Indigenous Technical Knowledge (ITKs).
- Farmers Participatory Research for evolving appropriate technologies based on indigenous knowledge systems.

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Appendix

APPENDIX 1

Study of Indigenous Technical Knowledge On Dairy Farming In Kathua District of Jammu & Kashmir

Interview schedule for farmers

PART: A

S.No. . . . . Date: . . . . .

1. Name of the Respondent: ……...
2. Father's Name: ……...
3. Name of the Village: ……..
4. Block: ……...

I. SOCIO-ECONOMIC VARIABLES

1. **Age: ……** (Completed years)
2. **Education: (please √)**
   a. Illiterate (0)
   b. Functionally literate (1)
   c. Primary (2)
   d. Middle (3)
   e. Secondary(upto matric) (4)
   f. Higher secondary(upto 12^{th}) (5)
   g. Graduate and above (6)
3. **Family size:** ……..
4. **Family type:**
   a. Nuclear (1)
   b. Joint (2)
5. **Social participation:** Have you ever been a member of any organization?
   Yes/ No. If Yes, please give the following particulars:

S.No.	Name of the organization	Member		Office bearer	
		Past (1)	Present (2)	Past (3)	Present (4)
1.	Panchayat				
2.	Milk cooperative society				
3.	Religious committee				
4.	Youth club				
5.	Krishak sangh				
6.	N.G.O.				
7.	Self help group				
8.	Political organization				
9.	Any other				

6. **Occupation: (please √)**

Occupation	Please specify
Agriculture	
Dairying	
Business	
Labour	
Service	
Others	

7. **Land holding:** As per Govt. of India, 2001
   a. Landless (0 ha)
   b. Marginal (< 1 ha)
   c. Small (1-2 ha)
   d. Semi- medium (2-4 ha)
   e. Medium (4-10 ha)
   f. Large (>10 ha)

8. **Herd size:**

S.No	Type of animal	In milk	Dry	Heifer (>18month)	Young (7-8 months)	Calves (up to 6 months)	Bullock	Total
1.	Indigenous cow							
2.	Crossbred cow							
3.	Buffalo							
4.	Goat							
5.	Sheep							

9. **Milk production and Consumption:**

Milch animals	Number	Milk production (Lts/day)	Milk consumption (Lts/day)
Indigenous cow			
Crossbred cow			
Buffalo			

10. Sale of Milk (Lts/day): ……

a. Do you sell milk? Yes/No
b. Milk Disposal Pattern
    i. Cooperative
    ii. Middlemen
    iii. Directly to consumer
    iv. Hotel or Halwai

11. **Total annual income (from all sources): ₹…….**

S. No.	Occupation	Income (₹)
a.	Agriculture	
b.	Dairying	
c.	Business	
d.	Labour	
e.	Service	
f.	Others	
	Total	

12. Mass Media Exposure

Please indicate to which of the following media you had been exposed to in obtained information about the dairy innovations during last one year and how often

S.No.	Source	Frequency of contact			
		Mostly (3)	Often (2)	Sometimes (1)	Never (0)
1	Film regarding dairy husbandry practices				
2					
3	Radio				
4	TV				
5	Poster				
6	Dairy Melas				
7	Cattle show/exhibitions				
8	Farmer's tour				
9	Demonstration				
10	Newsletter, leaflet, bulletins				
11	Folk-media				

13. **Extension contact:** How often do you visit and discuss matters related to dairy enterprise with the following extension personal / agency

S.NO.	Extension personal/ agency	Weekly (4)	Fortnightly (3)	Monthly (2)	Half yearly (1)	Never (0)
1.	VDO					
2.	VO					
3.	BDO/ADO					
4.	VLDA/Stockman					
5.	Scientists					
6.	Others					

II. ATTRIBUTE VARIABLES

Documentation of Indigenous Technical Knowledge (ITK) and Existing Practices

a) ITK used for breeding purpose

b) ITK used for feeding purpose

c) ITK used for health care practices of animals

Specify your method of treatment in following ailment.

S.NO.	Ailment	Treatment
1.	Internal worms	
2.	Ticks and lice	
3.	Bloat	
4.	Eye infection	
5.	Wound	
6.	Abortion of animal	
7.	Cold and cough	
8.	Poisoning	
9.	Sprain	
10.	Diarrhoea	
11.	Sterility	
12.	Fracture	
13.	Snake bite	
14.	Ulcer	
15.	FMD	
16.	Rinderpest	
18.	H.S.	

19. 20. 21. 22. 23. 24.	Mastitis Milk fever Pneumonia Tympany Dysentery Digestive problem	

III. Validation of selected ITKs

Alternatives / Attributes	MVD	ITK- 1	ITK-2
Effectiveness			
Side effect			
Cost effectiveness			
Availability			
Quickness in healing			
Ease in preparation			

IV. Factors determining the use of ITKs.

Please give your opinion about the Factors, which determine the use of ITKs by the respondents

Sl. No.	Factors	Rank
1.	Farmers having deep knowledge of ITK	
2.	ITKs are often cheaper i.e cost-effective	
3.	Locally and easily available	
4.	Lesser side effects	
5.	ITK is compatible with local situation and easy to adopt	
6.	ITK is less dependent on the use of external inputs	
7.	ITK is farmer oriented and evolved by the farmer's	
8.	Lack of faith in modern medicine	
9.	Lack of linkages and coordination among the various agencies	
10.	Distant location of Veterinary hospital,non availability and high cost of Veterinary medicines	

11. Any other

Specify them:

Appendix 2

Cumulative Square Root of Frequency (CSRF) method

Of the various methods available to determine stratum boundaries, cumulative square root of frequency (CSRF) method allows greater efficiency for setting stratum boundaries. CSRF methodology breaks down the population into intervals, which can be of equal or unequal width. The steps involved in its calculation are given below:

1. Evaluate the data and determine the units that can be reviewed on an actual basis.
2. Stratify the remaining data into ranges or classes. No of classes and class interval are determined using the formulas given as below :
   No. of classes = 2.5 x (number of samples) ^{¼}

$$\text{Class interval} = \frac{\text{(Largest figure – smallest figure)}}{\text{No. of classes}}$$

3. Determine the frequency for each range. This is the number of units within the range.
4. Calculate the square root of the frequency for the first range. Then calculate the square root of the next range. Continue this process for each of the ranges.
5. Sum of the square root of the first and second range gives cumulative square root of the second range; sum of first, second and third gives the third range and so on for all the ranges.
6. The cumulative square root frequency value of the last class is divided by the number of sample strata desired (can vary 3-9) to get the cumulative square root value for each item.
7. Suppose, we desire to have 3 strata, then the upper limit of the first strata is determined using the formula as given below:

$$L_i = Y_{i-1} + \frac{(Y_i - Y_{i-1})\{(S_k/L) - S_{i-1}\}}{\sqrt{f}} \quad \ldots\ldots\ldots\ldots \text{Value 1}$$

Where L_i = Upper limit of the i^{th} strata (In this case first strata)

L = Number of strata

Y_i = Upper limit of the class in which L_i lies

Y_{i-1} = Lower limit of the class in which L_i lies

S_k = Cumulative square root frequency value

$\sqrt{f}$ = Square root of the frequency of the i^{th} class in which L_i (S_k/L) lies

S_{i-1} = Cumulative square root frequency of the preceding class in which L_i (S_k/L) lies

$Y_i - Y_{i-1}$= Width of the class in which in which L_i (S_k/L) lies

For the upper limit of second strata, the formula is:

$$L_i = Y_{i-1} + \frac{(Y_i - Y_{i-1})}{\sqrt{f}} \{(S_k/L) \times 2 - S_{i-1}\} \ldots\ldots\text{Value 2}$$

For the upper limit of third strata, the formula is:

$$L_i = Y_{i-1} + \frac{(Y_i - Y_{i-1})}{\sqrt{f}} \{(S_k/L) \times 3 - S_{i-1}\} \ldots\ldots\text{Value 3}$$

In this way, three strata are formed i.e., below value 1, between value 1 and value 2 and above value 2 up to value 3

Appendix 3

Duncan's Multiple Range Test (DMRT)

The difference of means between subclasses for different alternatives (MVD, ITK-1 and ITK-2) used for treatment of animals were tested for significance using Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957).

$$(Y_i - Y_j) \sqrt{\frac{2}{C_{ii} + C_{jj} - 2C_{ij}}} > Zpn_e$$

$(Y_i - Y_j)$ = Mean difference between two subclasses

C_{ii} = Corresponding diagonal element of i^{th} subclass

C_{jj} = Corresponding diagonal element of j^{th} subclass

C_{ij} = Corresponding off-diagonal element of ij^{th} subclass

Zpn_e = Significant ($p<0.05$ and $p<0.01$) Studentized Range Value in Duncan's Table (Duncan, 1955) at number of higher means in range chosen (p) and error degrees of freedom (n_e)

Appendix 4

Single factor ANOVA

Analysis of variance, or ANOVA in its simplest form, provides an extension of the t-test, enabling testing of hypothesis regarding two or more means. In more complex designs it enables us to consider the effects of two or more factors simultaneously without disregarding the possible interaction between them. In its simplest form, the analysis is used to understand the effects of a single factor acting alone. ANOVA provides a basis for deciding between there is good evidence of a true difference between samples/methods.

ANOVA uses the F –distribution instead of t –distribution. It assumes that all the sets of data have equal variances. It only shows that a difference exists or not.