AN APPRAISAL OF CATTLE AND BUFFALO INSURANCE AMONG DAIRY FARMERS IN UTTAR PRADESH

Thesis

Submitted in partial fulfilment of the requirement for the degree
of
Doctor of Philosophy
in
VETERINARY EXTENSION EDUCATION

By
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To
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Dated: 22 March, 2010

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Certified that the research work embodied in this thesis entitled "**An Appraisal of Cattle and Buffalo Insurance among Dairy Farmers in Uttar Pradesh**" submitted by Dr. Mohd Ameer Khan, Roll No. 1083, for the award of Doctor of Philosophy Degree in Veterinary Extension Education at Indian Veterinary Research Institute, Izatnagar, is the original work carried out by the candidate himself under my supervision and guidance.

It is further certified that Dr. Mohd Ameer Khan, Roll No. 1083 has worked for more than 30 months in the Institute and has put in more than 300 days attendance under me from the date of registration for the Doctor of Philosophy Degree in this Deemed University, as required under the relevant ordinance.

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Certificate

Certified that the thesis entitled, **"An Appraisal of Cattle and Buffalo Insurance among Dairy Farmers in Uttar Pradesh"** submitted by Dr. Mohd Ameer Khan, Roll No. 1083, in partial fulfilment of the requirement of Doctor of Philosophy degree in Veterinary Extension Education at Indian Veterinary Research Institute, Izatnagar, embodies the original work done by the candidate. The candidate has carried out his work sincerely and methodically.

We have gone through the contents of the thesis and are fully satisfied with the work carried out by the candidate, which is being presented by him for the award of Ph.D. Degree of this Institute.

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1 Introduction

The Indian economy is growing at high rate with two third of the country's population engaged in farming and herding. The agriculture and allied sectors contribute about 15.7 percent of the National Gross Domestic Product (Eco. Survey of India, 2009-10). Within the agriculture sector, the allied sectors like horticulture, animal husbandry, dairy and fisheries have an important bearing on the overall economic growth, and also on health and nutrition of the masses. Within the allied sectors, livestock contributes about 4.07 percent of total GDP during 2008-09 and 26.84 percent value of output from agriculture and allied activities (Eco. Survey of India, 2009-10). Livestock production is prominent in India and carried out on a subsistence and traditional way which provides supplementary income to the livestock farmers. Livestock especially cattle, buffalo, sheep, goat, pig and chickens are kept for food production, traction, hides, manure, risk diversification and as alternatives to farmer financing. India has the largest livestock population in the world. According to FAO (2008), India has 174.5 million cattle, 98.6 million buffalo, 125.7 million goat and 65 million sheep. India ranks first in cattle and buffalo population, second in respect of goat and third in respect of sheep population in the world (GOI, 2002).

Livestock production has been growing at a faster rate than any other agricultural sub-sector, and it is predicted that by 2020 livestock will account for more than half of total global agricultural output in financial terms (Delgado *et al*., 1999). Government of India initiated intensification programme in the area of poultry and dairy sub-sectors comprising subsidized inputs, veterinary and extension services.

The programmes were successful in terms of growth, which has resulted in significant increase in the milk and egg production to the level of 108.5 million tones milk and 55.6 billion eggs in the year 2008-09 (Eco. Survey of India, 2009-10). India continues to be the largest producer of milk in the world.

Livestock keeping is crucial for rural people. Livestock not only carry heavy loads, help cultivate fields and provide transportation, they also represent an important asset for rural people. Livestock are a form of currency, often given as loans or gifts, and their sale can provide quick cash in times of need. Income from livestock and their products enables poor families to put food on the table, improve their nutrition, send their children to school and buy medicine for themselves and their animals. With increase in per capita income, the demand for meat and milk products increases which poses a great opportunity for millions of rural livestock holders.

It should be recognized that livestock related economic activities have some unique features, in terms of income generation. Livestock more frequently generate source of continuous income than agriculture. Traditional agricultural activity produces seasonal incomes (typically twice a year in lump sums). Due to seasonal income, it is left to the individual farmers to manage their cash flow uncertainties over the rest of the year. In contrast, livestock related activities may give a daily flow of income as in the case of dairies, poultry and fisheries, a weekly income in the case of bee-keeping, sericulture and a fortnightly or monthly income, in goat and sheep rearing. In other words, the livestock related economic activities provides a diversified source of income and mitigates the uncertainties of seasonal income as in case of agriculture.

In India, about 75 percent of rural households are small and marginal farmers. They own 56 percent of large ruminants and 62 percent of small ruminants (World Bank, 1999). In most of the dry land and hill regions, more than 70 percent of family income is derived from livestock (GOI, 2002). In rural India, nearly every household has 1-2 milch animals or few small stocks like goat and sheep or poultry. These animals improve the income of rural people and give enormous scope for India to

boost the rural economy. They rear the animal side by side to their main occupation. In general, livestock wealth is more equitably distributed than land. The growth in livestock sector results in a more balanced development of rural economy and accelerates the rate of poverty alleviation.

In India, where agriculture, including livestock, is the main contributor to economic growth and poverty alleviation, the livestock sub-sector is changing more rapidly and per capita demand for livestock products is increasing. The factors such as insecure land tenure, ineffective animal health services and limited access to credit and inputs prevent from making profitable use of their livestock, hindering a productivity revolution. The livestock activities are inherently risky and include animal mortality and morbidity due to infectious livestock diseases and changing output prices. Furthermore, livestock production is also affected by climatic shock, price volatility, weak marketing infrastructure, flooding, drought, illness of household members and crime that lead to loss of herd and wealth, all of which can have major effects on rural livelihoods.

The risk environment for livestock farmers are: price, production, market, financial, health, resource, asset and legal risks (more government regulation). The intensity and domination of risk varies widely across regions. Risks facing livestock producers can be divided into market related risks and non market related risks. Market related risks relate directly to the transaction in the economy. They include: availability of input, the prices of input, the prices of farm products, the availability of market for farm output, the gross margin of agricultural enterprises and the revenue derived from farming operations. Non market related risks relate to a variety of events, some involving human intervention, directly or indirectly. These risks include: climate events, disease, accidents, theft, predation, infrastructure and environment problem and managemental problems. In order to mitigate or minimize the risk, appropriate steps are needed at different levels.

Livestock farming is inherently one of the riskiest economic activities. Risk, uncertainty and vulnerability are three terms basic to any decision making framework. Risk can be defined as likelihood of occurrence of shocks and stresses

with imperfect knowledge where the probabilities of the possible outcomes are known, uncertainty exists when these probabilities are not known while vulnerability is the susceptibility of households or individuals to specific events (Hardaker *et al*., 2004). The degree of vulnerability to shocks and stresses varies among farmers depending upon their location, asset status, information and communication and social networks. Schultz (1953) while emphasizing the role of nature in agriculture production states "…..In this large area, the hand of nature lifts and depresses yields despite all the efforts of farmers to counteract its influence." Fluctuation in income due to variability in production and commodity prices is one of the most significant features of the livestock farming. Diseases and pest also kill and disable livestock often causing losses of great value.

The problems related to health (morbidity and mortality), breeding, nutrition and management reduce the production potential of the livestock. The presence of livestock diseases constitutes costly constraints towards the improvement and expansion of the livestock industry in India. Livestock diseases cause enormous losses ranging from death of livestock, production and productivity losses, treatment cost, reduction of market opportunities due to notifiable diseases and threats to human health due to genetic and food borne diseases. For instance, Birthal and Jha (2005) reported annual loss of dairy output worth Rs. 50,939 million due to health constraints. It was reported that in 2002-03 dairy output worth Rs. 2,83,097 million was lost due to different diseases, equivalent to 26% of attainable output. Species wise indigenous cows suffer the most with a reduction of 37.6 % in its attainable output followed by buffaloes and cross breed cows. It is estimated that up to 30 percent of livestock production in developing countries is lost due to diseases (FAO, 1990). The recent outbreak of bird flu in West Bengal and north east states caused a great loss of wealth to poultry owners. The most important animal diseases in India include Foot and Mouth Disease, Peste des petits ruminants (PPR), Blue tongue, Sheep pox and goat pox, Classical swine fever, New castle disease, Anthrax, Haemorrrhagic septicaemia, Coccidiosis, Black quarter, Mastitis etc, which cause heavy economic losses to livestock farmers. The direct losses due to FMD were estimated to be more than Rs. 15,000 - 20,000 million per year. In addition to this, the milk and milk

products, meat and hide are not accepted by countries free from the disease, causing reduction in the export potential of livestock industry (Krishna, 2000)

Farmers are committing suicides in recent years due to failure of agricultural enterprises or crash in market prices. Farmers are the most direct and primary victims who face the consequences of livestock risks (Skees and Enkh, 2002). The relief measures taken up by the government at this time are re-scheduling of loans, supply of input and other relief measures (Ahsan, 1985). Whereas, the impact of diseases and loss of production may be disastrous for the resource poor livestock keepers. Livestock farmers sell their productive assets to cope up with the losses and fulfill their regular and contingent consumption needs (Jodha, 1975).

Investment and production decisions by farmers are usually made within environments that are affected by a multitude of risks. The existence of such risks has been found to alter household behavior. In many studies, it has been found that risks cause farmers to be less willing to undertake activities and investments that have higher expected outcomes, but carry with them risks of failure . It is not uncommon to observe farm households being reluctant to adopt new technologies even when those technologies provide higher returns than traditional technologies.

Improved livestock farming is supposed to be rational and efficient. However, several studies have noted that modern techniques are thought to be more risky than traditional techniques. The livestock farmers who are rational but poor will be averse to risk and will under-invest in modern techniques (Roumasset, 1979). There are a lot of evidences which suggest that risk averse attitude of farmers inhibits maximization of returns from available resources (Dillon and Anderson, 1971; Lin *et al.*, 1974; Binswanger, 1978; Hamal and Anderson, 1982). The risk aversion of the farmers results in the continuation of the traditional livestock farming practices instead of modern technology/practices.

In order to cope with different risks, farmers have developed number of risk management strategies. Farmers manage risks through a continuous adoptive process, whereby decisions are made based on perception of the external environment,

resources and farmers' own attitude and preferences (IFAD, 2004). In risk management process, farmers consider and respond to a combination of external and internal factors, such as market access and the resources available to the farm households. Resource poor farmers have less capacity to manage risks. Farmers as individual also differ in their goals and attitudes towards risks. Furthermore, changes in risk preferences affect the optimal farm enterprise combination (Nyikal and Kosura, 2005). The risk management process involves selecting among alternatives that have uncertain outcomes and varying levels of expected returns. In general, tools for risk management in agriculture are distinguished in strategies concerning on-farm measures (diversification of a production) or risk sharing strategies like marketing contracts, production contracts, hedging on futures markets, revenue and income stabilization schemes and insurances (MAFF, 2001).

The choice of risk management decisions and practices follows five steps: Farmers acquire knowledge of their own context, risk identification, risk analysis, risk assessment and selection of most suitable option for avoiding, presenting or managing the risks (Hardakar *et al.*, 1997). For disease risk management, it is not only the farmers' perception of the disease risk that is important, but also their perception of potential additional risk associated with available disease control strategies.

Livestock farmers typically become concerned about risk when the outcomes are unfavorable. Thus, when someone says that a farmer is taking a risk then it means that the farmer is faced with a situation where there is at least some chance that a loss will occur (Hardaker *et al*. 2004). Risk reduces incentives for investment and economic growth (Arrow, 1964; 1996). For example, a livestock farmer would be less likely to invest in crossbred if he had to assume the risk of losing the animal to a disease. However, if that risk could be shared through the purchase of disease insurance, the farmer would be more willing to invest in crossbreds. By this way, economic growth can be stimulated by effectively transferring the risk from more risk averse farmers to less risk averse farmers. On the other hand, the lack of risk transfer mechanism can retard the economic growth. Risk and profit are in general

positively correlated. Taking more risks can increase farmer's profit. Farmers can be greatly motivated to take more risk if a suitable risk transfer mechanism is introduced in the production system.

Insurance is probably the most common market based risk management instrument. Insurance is a legal contract whereby risks are transferred from one party to another in exchange for a premium. Insurance purchase is sufficiently risk averse that they are willing to accept a small loss with certainty (the insurance premium) rather than face the risk of a much larger loss (Koontz *et al.,* 2006). Livestock insurance is an important measure for all natural and unavoidable hazards. Livestock insurance schemes are relevant strategies in managing disease risks (Meuwissen *et al.,* 2001). Livestock insurance is a mechanism to protect farmers against the uncertainties beyond farmers' control. It is also a financial mechanism which minimizes the uncertainty of loss in livestock production. In a country like India, where livestock production is subjected to various types of risks, livestock insurance assumes a very vital role (FAO, 1992).

Livestock Insurance has been identified to play an important role for livestock owners by getting the loss due to different reasons by paying in the form of insurance which in turns encourage the farmers to further invest in the livestock production. Economic decision makers are often risk averse. This implies that given the choice between a less risky alternative and more risky alternative, they will often choose the less risky alternative even when the expected return is less than the expected return of more risky alternative. This is why insurance market exist. Risk averse individuals are willing to pay an insurance premium to reduce their risk

The principle of insurance is risk-sharing. Livestock insurance is one of the financial tools used to manage the various risks that may arise in livestock production. It operates by transferring the risks associated with farming to a third party via payment of a premium that reflects the true long-term cost of the insurer assuming those risks. In other words, the insurance agency is able to pool the risks by accepting appropriate premiums from a large number of clients. If implemented and managed efficiently livestock insurance which one of the most often quoted tools for risk

management, can play a significant role in managing the risks related with livestock farming. Thus, livestock insurance has a bright future driven by increasing demand of livestock products, commercialization, international trade and the development of new insurance products.

There are a number of instances where farmers showed reluctance to accept credit for purchase of good milch animals because of fear of losing them even if the loan is cleared. Cattle insurance is important measure among the many measures that could be taken to decrease the number of inferior cattle and buffalo and increase investment on high quality animals. Removal of risk of loss on invested capital on animals would encourage farmers to go in for superior female stock for breeding and milk production. The earlier attempts for promoting cattle insurance both by governments and insurance agencies did not meet with good success. (National Commission on Agriculture, 1976).

Insurance existed since the ancient time and some records indicate that it was in practice in Babylon. In India, cooperative societies have been in existence in the cattle insurance business before independence. After independence, the Government of India (GOI) seriously started thinking about cattle insurance. The minister of food and agriculture, Dr. Rajendra Prasad, gave the assurance that GOI would examine the feasibility of cattle insurance in India. In 1948, GOI appointed Mr. G.S. Pirolker to prepare a plan and it was submitted in August 1949 which was conducted on pilot basis in third five year plan (Agrawal and Bansal, 1969).

The ministry of food and agriculture examined a crop insurance scheme soon after independence in 1947 and a special study was commissioned during 1947-48 for this purpose (Raju and Chand, 2007). The GOI has been much involved over the years with broad range of insurance services in the country. From 1972 until 2000, the state owned General Insurance Corporation (GIC) was the only body permitted to transact insurance business and it did so through its then subsidiary companies namely National Insurance Company Ltd., New India Assurance Company Ltd., Oriental Insurance Company Ltd. and United India Insurance Company Ltd. In the year 2000, the insurance market was liberalized, permitting

the private sector to develop and sell insurance products. Nevertheless, the state owned companies still transact a significant share of all insurance business and predominant in the field of livestock risk.

The idea of livestock insurance emerged in India before three decades, yet, it has not operated in a significant way till date. It is still evolving in terms of scope, spread and structure. The Department of Animal Husbandry, Dairying and Fisheries GOI, has been taking keen interest in livestock insurance and launched a National Livestock Insurance Scheme on pilot basis in 2005-06 in 100 selected districts of India with an outlay of Rs. 120 crore (ESI, 2007-08). The central government provided subsidy of 50 percent of the premium under the scheme to ensure crossbred and high yielding cattle and buffaloes. About 5.2 lakh animals were insured in initial two years at an expenditure of about Rs. 23.4 crores. The scheme is being continued in 2007-08 with an outlay of Rs. 35 crores (ESI, 2007-08). The implementing agencies for livestock insurance in the states are State Livestock Development Boards. The main functions under the scheme are to manage central funds, call quotation from insurance companies and payment of premium subsidy as well as payment to identified veterinary practitioner, in different districts. The scheme selects insurance companies on the basis of price quotas and service efficiency. The premium rate is upwardly restricted to 4.5 percent for annual policy and 12 percent for 3 year policy.

The livestock insurance scheme primarily covers the death of the animals. All additional coverage, such as 'Disability Risk', must be paid for by the beneficiaries. There is a premium subsidy of 50 percent and the sum insured, is the current market price as certified by a veterinary surgeon. Livestock insurance cover is available for almost all types of livestock species. Normally an animal is insured up to 100 percent of the market value. The premium is 4 percent of the sum insured for the general public and 2.25 percent for other government schemes beneficiaries. The government subsidizes premium for different schemes. Progress of livestock insurance scheme has been slow and poor. In 2002-03, about 29.40 million heads were insured which comprised 6.09 percent of total livestock population (Raju and Chand, 2007).

A feature of the Indian livestock insurance products is that they tend to target dairy production units, especially raising crossbred and other high yielding cattle and buffaloes. This situation is logical, since rearing of milking herds of this type of livestock are likely to be more commercially oriented than more traditional livestock production systems, and therefore the demand for insurance is likely to be greater in the case of former. It is mandatory to insure animals purchased under any government schemes with the financial assistance from the bank. The animal insured include sheep, goat, pig, poultry etc. Sheep and goats constitute nearly one fourth of the total livestock insured by the GIC of India (Bhende, 2005).

Livestock Insurance Scenario in Uttar Pradesh

The economy of Uttar Pradesh (U.P.) is predominantly agrarian and performance of agriculture and allied activities such as horticulture, animal husbandry, dairying and fisheries are critical in determining the growth rate of the economy of the State. According to livestock census 2003, U.P. has 18.5 million cattle and 22.9 million buffalo population which produce about 17 million tonnes of milk. Livestock sector has grown impressively in the State. The value of livestock output, which was 17 percent of the total agricultural output in 1980-81, rose to 27 percent in 1999-00. According to data released by NSSO based on 59th round of NSS, 24% of UP farmers (40% at all India level) did not like farming and felt that agriculture was not profitable (The Financial Express, 2010). Awareness level of UP farmers is close to that of all India figures in respect to crop insurance. At all India level, only 4% of farmer households had ever insured their crops and 57% did not know that crops could be insured. However, in UP, only 1.2% of farmer households had ever insured their crops and 56% were unaware that crops could be insured. This is also true in case of livestock insurance in which the level of awareness is very low (Kumar, 2005). Therefore, to promote livestock insurance among farmers, 12 districts were selected in Uttar Pradesh on pilot basis for implementation of livestock insurance scheme by UP Livestock Development Board.

Scant research attention has been given in ascertaining the impact that these insurance schemes have had till date, the existing and potential constraints in livestock

insurance and how to design livestock insurance products based upon inputs regarding farmers' perceptions and needs so as to ensure their success. The present study therefore, is an attempt to bridge this information gap.

In view of the above and considering the need and growing importance of livestock insurance, the study entitled "An Appraisal of Cattle and Buffalo Insurance among Dairy Farmers in Uttar Pradesh" was undertaken with the following specific objectives:

Specific Objectives:

1. To identify the sources of risks perceived by the dairy farmers.
2. To analyze farmers' willingness to pay for cattle and buffalo insurance.
3. To identify the existing problems in dairy animal insurance and suggest ways and means to improve it.

Need and Scope of the Study

It is clear that livestock insurance is an important innovation in India for any number of reasons. Livestock insurance is the key to mitigating losses. Once the insurance is available, moral hazard may occur as livestock farmer change their practices and become more risky. In a country like India it is nearly impossible to envision effective monitoring systems. Vast differences in management styles and risk among herders are common. It is also nearly impossible to imagine risk classification systems that would identify these differences before the insurance is sold. Finally, the large risks that are present in Indian livestock herding operations make livestock insurance extremely challenging. Despite these fundamental problems, the need for livestock insurance in India is very real. This study takes on the challenges of making livestock insurance work in Uttar Pradesh.

In India, insurance market especially in agricultural sector is usually underdeveloped. Farmers obtaining credit to purchase livestock face two risks: (1) loosing the livestock due to disease and subsequently (2) failure of investment in livestock and other enterprise. Farmers would like to reduce the uncertainty and it is

well noted that livestock insurance scheme is the relevant strategy in managing different risks related to livestock farming. But none of the previous studies has attempted to address the livestock insurance needs of the dairy farmers. There is a requirement for characterization of the insurance needs of dairy farmers and determination of the main factors which influence insurance participation. Livestock death is considered to be a main factor contributing to poverty. This study identified the different types of risks associated with dairy farming. Also, it focuses on vulnerability of dairy animals to different diseases/risks. While the demand for livestock services is expected to rise rapidly, a number of State Governments are facing budgetary difficulties. Policy initiative aimed at increased cost recovery, however, are often opposed due to the perception among policy makers that the farmers will not be willing to pay for livestock services. This study, therefore, addresses the basic question that how many people and to what extent they are willing to pay for animal insurance. Besides, it helps to know the different problems encountered in dairy animal insurance and suggest ways to improve it.

Limitation of the Study:

1. Every study has some limitations which apply to this study also. The researcher was confronted with problems such as time, finance as well as other resources and facilities.

2. This study was conducted in a particular location, hence, findings may be applicable only to such similar conditions.

3. The findings of the study were based on the ability of honesty and degree of cooperation of the respondents in providing their responses. Efforts were made to minimize the biasness and prejudice but still the prejudice and biasness in their responses can not be ruled out.

2 Review of Literature

This chapter deals with the references of the past studies which provide guidelines to design the research programme, analysis of data and to interpret the findings. Systematic and comprehensive review of literature provides proper background information for carrying out any research work in a systematic manner. The relevant literature pertaining to the study is presented under the following heads.

2.1 Economic losses due to animal diseases

2.2 Risks in livestock farming

2.3 Livestock insurance

2.4 Willingness to pay (WTP)

2.1 ECONOMIC LOSSES DUE TO ANIMAL DISEASES

Chauhan *et al*. (1994) collected data from 100 farmers of Kangra district of Himachal Pradesh and reported that economic losses due to various diseases per farm by small, medium, large farmer and overall calculated to be Rs. 2,652, Rs. 2,195, Rs. 2,172 and Rs. 2,509, respectively. Economic losses due to morbidity and mortality were Rs. 1,192 and Rs.1,317, respectively.

Saxena (1994) conducted a study to estimate the economic value of milk loss due to Foot and Mouth Disease (FMD) in buffaloes and cattle in India. The losses were categorized into three type's i.e. direct loss of milk due to reduction in yield, reduction in milk due to delayed conception and reduction due to abortions in

pregnant animals. For the study, 39 districts from 15 geographic clusters were selected. He found that all the three types of losses per sick animal were highest in crossbred cows, followed by buffaloes and indigenous cows, respectively. However, in terms of total annual losses, indigenous cows ranked the first followed by buffaloes and crossbred cows, respectively. As a whole, the disease caused a milk loss of about 3,508 million liters which was about 6.5 percent of total annual loss of milk valued at about Rs. 1,252 crores in terms of foreign exchange lost and from Rs. 1,650 crores to Rs. 1,873 crores in terms of domestic economic surplus lost.

Singh *et al*. (1997) estimated economic losses in dairy cattle due to mastitis. He found that the total annual financial loss due to mastitis in India was Rs. 1607.2 crores which included Rs. 889.51 crores for cows and Rs. 717.69 crores for buffaloes.

Many factors affect the efficiency of livestock production either directly or indirectly. These include the genetic constitution of the host, nutrition (or malnutrition), environment, management, other diseases and societal pressures that can interact in multiple ways influencing the ultimate productivity level, the overall mortality rate and the quality of the final product (Calnek, 1998).

Rehman *et al*. (1999) conducted a study to estimate the economic losses due to diseases in cattle at Sherpur district of Bangladesh. During the study period, he found 30 different diseases and health disorders and the total financial loss due to death alone was 1,48,000.00 taka and economic losses per family was 400.00 taka. Annual overall prevalence rate of all the diseases was 33 percent and overall annual mortality rate was 3.12 percent.

Garner *et al*. (2000) reported that around 5000 flocks and herds were affected by sheep and goat pox annually in Maharashtra, costing up to 107.5 millions rupees.

Krishna (2000) reported that the contagious viral diseases like FMD, PPR in cloven footed domestic animals causing irreparable economic losses to the farming community. The direct losses due to FMD were estimated to be more than Rs. 15,000 - 20,000 million rupees per year. In addition to this, the milk and milk products, meat and hide are not accepted by countries free from the disease, causing reduction in the export potential of livestock industry.

Swallow (2000) in his study in sub-humid west Africa observed the multiple negative impacts of trypanosomiasis in the mixed crop-livestock system which include reduced calving/lambing/kidding rates, increased mortality, decreased milk production, increased use of medicine, decreased draught efficiency, decreased agricultural production, change in biodiversity and loss of income and assets. The zoonotic disease and food borne diseases mainly affect consumers, food processing workers and livestock producer (FAO, 2002).

Livestock industry has enormous potential to cope up with poverty in developing countries; however, the health and growth of this industry are being threatened by the emergence of animal diseases. Globalization of the sector increases the potential for disease introductions, a form of invasive species increasingly critical for livestock sector (Armbruster, 2005).

Birthal and Jha (2005) reported that in 2002-03 dairy output worth Rs. 2,83,097 million was lost due to different diseases, equivalent to 26% of attainable output. Species wise indigenous cows suffer the most with a reduction of 37.6 % in its attainable output followed by buffaloes and cross breed cows.

Venkataramanan *et al.* (2005) reported that total annual loss due to peste des petits ruminants in India was Rs. 1.8 billion (US $ 36 million) in which annual loss due to mortality was Rs. 1.5 billion, annual loss due to morbidity Rs. 200 million and annual indirect loss (export restriction etc.) was Rs. 100 million.

Chander *et al.* (2006) in their study in Bareilly district of Uttar Pradesh revealed that there was inadequate financing by the government for the provision of animal health services and major portion of the budget allocation was spent on Direction and Administration rather than animal health and extension.

Gall (2006) reported that the consequences of animal diseases in livestock and domesticated birds can be complex and generally go well beyond the immediate effects on affected producers. These diseases have numerous impacts, including productivity losses for the livestock sector (e.g. production losses, cost of treatment, market disturbances), loss of income from activities using animal resources (in such

sectors as agriculture, energy, transportation, tourism), prevention or control costs (production costs, public expenditure) and suboptimal use of production potential (animal species, genetics, livestock practices).

2.2 RISKS IN LIVESTOCK FARMING

Ray (1971) reported that access and availability of insurance changes the attitude of the farmer and induces him to take decisions which, otherwise, would not have taken due to aversion to risk.

Jodha (1981) found that official credit institutions are ill equipped to reduce the exposure of Indian farmers to risks because they cannot or do not provide consumption loans to drought-affected farmers.

Pemberton (1980) carried out surveys in Trinidad and Tobago and found that in Tobago there was a high degree of risk indifference with 42 % of farmers finding that they did not encounter uncertainty in their farm operations. Farmers in Trinidad demonstrated a greater degree of risk aversion (72 %). Insurance coverage of these risks may thus be favourably accepted by a large number of farmers.

Insurance acts as complementary to other agricultural risk shifting measures such as credit, irrigation, soil conservation etc. The spread of green and white revolution technology in better endowed regions and better-off farmers benefit from it. The small and marginal farmers could not adopt improved technology due to fear of crop and livestock failure despite availability of credit (Ahsan 1985).

Bosch and Johnson (1992) conducted a study on randomly selected 38 dairy farmers at Rockingham County, Virginia located at Sheanandoah valley. Rockingham County was chosen because of its most important dairy producing county in the sate. Variability in feed prices and crop yield were important sources of risk to dairy farmers.

Templer *et al*. (1993) revealed that certain covariate risks, particularly climatic shocks, represent a case for maintaining the role of the state in risk management and insurance strategies, at least until market institutions and/or social institutions

have developed adequate alternative strategies. They collected data from 60 herding households who suffered losses during the bad winter of 1993 from Mongolia. It is shown that poorer households suffered disproportionately. Consequently it was argued that without the adequate external provision of safety nets, the significance of environmental risks for individual households, particularly poorer ones, is likely to greater increase. They concluded that there was an urgent need to revitalize the livestock insurance system, and to adapt it to the changed circumstances of the market economy and predominantly private animal ownership.

Sivanaryana and Reddy (1995) reported that the major constraints of sheep and goat farmers of Guntur district of Andhra Pradesh were: lack of knowledge, non-availability of crossbreds, poor adaptability of crossbreds, being unaware of the practice, scarcity of own grazing land, poor economic status, negligence of the practice, non-availability of concentrates, difficulty in premium payments and careless/indifferent attitudes towards insurance of animals.

Trade liberalization accelerates the growth in demand for livestock products. This emerging scenario would have considerable bearing on future demand and supply patterns of livestock products. This demand better health care facilities and protection of animal producers from different shocks (Kumar, 1996).

An analysis of data from US agriculture indicates that the producer's first response to risk is to restrict the use of debt. Price support programmes and crop insurance are substitutes in reducing producer risk. The availability of crop insurance in a setting with price supports allows producers to service higher levels of debt with no increase in risk (Atwood *et al.*, 1996).

Bhattu *et al*. (1999) reported that high cost and poor quality of inputs, oligopsony marketing structure, high electricity charges, incidence of diseases, non-remunerative prices of broilers, and existence of rigid procedure for government grant or bank loans, and lack of broiler insurance schemes were the major constraints encountered by broiler farmers in Haryana, India.

Kurnosov and Kamalyan (2000) have studied risk factors in the planning and development of agricultural policy. Risk factors involved in farming include the instability of yields and farm incomes, the occurrence of natural disasters and their effects on production and costs, and the need to make investments and allocate resources well before actual yields and prices are known. In developed countries, governments often play an active role in helping producers to manage risk successfully.

Meuwissen *et. al.* (2001) in their study on a large sample of livestock farmers (*n*=612) in the Netherlands found that, in general, price and production risks were perceived as important sources of risk. Insurance schemes were perceived as relevant strategies to manage risks. More detailed analyses of the perceptions show that dairy farmers generally saw price risks as very important, while pig and mixed farmers were more likely to rank production risks as very important. They found that insurance was perceived relatively less important by mixed farmers than by other farmers. Although their results indicated that perceptions of risk and risk management were very personal, i.e. farmer-specific.

Dhaka *et al* (2004) reported the sources of information among sheep farmers in the semi-arid regions of Rajasthan, India. He found that progressive farmers were the most trusted (71.33%) source of information, followed by veterinary officers (34.66%). Information related to insurance (56.66%) and disaster relief (51.99%) followed by risk management (33.99%) were the most needed by respondents; given the fact that drought was a recurring phenomenon.

Farmers often face risky situations in agriculture. A risk means the possibility of a loss of income or property. Farm risks can be divided into business and financial risks. Business risk is related to production, price, institutional and personal risk. Financial risk results from the method of financing and is related to the debts and equity of the farm (Hardaker *et al*., 2004).

Bajramovic *et al*. (2005) examined the sources of risk and uncertainty in agriculture (production risk, marketing/price risk, financial risk, institutional risk,

and personal risk) as well as the ways and tools of managing these risks and uncertainties. Two types of risk management strategies were proposed: strategies concerning on-farm measures (including the selection of productions with low risk exposure or with short production cycles, diversification, holding sufficient liquidity) and risk sharing with other strategies (including marketing contracts, production contracts, hedging on future markets, insurance, participation in mutual funds). Also, the share of income from sources outside agriculture is important to reduce risk.

Flaten *et al*. (2005) examined organic and conventional dairy farmers' perceptions of risk and risk management, and examined relationships between farm and farmer characteristics, risk perceptions, and strategies. The data originate from a survey of conventional and organic dairy farmers in Norway. Organic farmers had the least risk averse perceptions. Institutional and production risks were perceived as primary sources of risk, with farm support payments at the top. Compared to their conventional colleagues, organic farmers gave more weight to institutional factors related to their production systems. Conventional farmers were more concerned about costs of purchased inputs and animal welfare policy. Organic and conventional farmers' management responses were more similar than their risk perceptions. Financial measures such as liquidity and costs of production, disease prevention, and insurance were perceived as important ways to handle risk.

Bardhan and Tewari (2007) conducted a study in the Tarai area of Uttaranchal state of India to (i) identify the sources of risks perceived to be relevant by the farmers, (ii) examine farmers' risk attitude, (iii) identify the factors that affect risk attitudes and (iv) evaluate the relative importance of different risk management strategies. Adverse effect on family health was perceived as a major source of risk by the dairy farmers, indicating the crucial role that surplus family labour plays in dairy farming in India. Lack of institutional support in dairying was also perceived to be a major source risk. The study further revealed slight degree of risk aversion among farmers as revealed by the adoption of such risk management tools like vaccinating the animals, calling a veterinarian, prevention of illness, maintaining

hygienic conditions, and feeding adequate concentrates. Hence, there is a strong tendency on the part of the farmers to mitigate the production risks at farm level by adapting appropriate measures. But, a certain degree of risk taking behaviour was also seen in regard to certain risk management tools, especially livestock insurance.

It is useful to understand strategies and mechanisms used by producers to deal with risk, and to distinguish between informal and formal risk management mechanisms and between ex ante and ex post strategies. As highlighted in the 2000/ 2001 World Development Report 2001, informal strategies are identified as "arrangements that involve individuals or households or such groups as communities or villages," while formal arrangements are "market-based activities and publicly provided mechanisms." The ex ante or ex post classification focuses on the point in time in which the reaction to risk takes place: prior to the occurrence of the potential harming event (ex ante) or after the event has occurred (ex post). Among the ex ante reactions, it can also be useful to highlight the differences between on-farm strategies and risk-sharing strategies (Govt. of India, 2007).

2.3 LIVESTOCK INSURANCE

Averin (1978) reported that agricultural cattle insurance in the Soviet Union pays 70% of the book value of the stock lost, i.e. in the case of productive and breeding stock, roughly their replacement cost, and in the case of working animals their original cost minus depreciation.

Betz and Haisch (1979) found that in southwestern Germany on average the cooperatives had more insurance agreements than other types of dairies, and therefore appeared less inclined to accept risk. The types of insurance which were more common among cooperatives than among other dairies included insurance of equipment and stocks against fire, general liability insurance, insurance against liability for damage caused by water, insurance against burglary and theft, and insurance against shutdown due to epidemics. There were, however, certain types of insurance which were more common among the other dairies, e.g. transport insurance, and insurance against damage due to loss of electric power. Large dairies (>50 million kg/yr) had more insurance agreements than smaller dairies.

Shenoy *et al*. (1987) evaluated the milch cattle insurance scheme and suggested appropriate measures for further improving the effectiveness of the scheme. It was conducted in Olpad and Sougadh Blocks, Surat District, Gujarat and Shirur and Bhor Blocks, Pune District, Maharashtra during 1985. The milch cattle insurance scheme had made a significant contribution in terms of increasing milk production levels and raising the income of the beneficiary households, although it had not increased the stock of milch animals. Mass media facilities were not used properly, failing to create sufficient awareness of the insurance scheme amongst cattle owners.

Reddy *et al*. (1987) examined the benefits realized by borrower beneficiaries under the village adoption scheme of North Bangalore taluka, Karnataka, which was adopted by a commercial bank under the 'area approach' programme. They found that banks financed the commercial activities such as crops, dairy cattle, sheep, pig and bullock production and small businesses. Livestock enterprises covered under formal insurance are popular, yield relatively high incomes and have significant employment potential for family members.

Bhanja and Venkatadri (1988) reviewed Integrated Rural Development Programme implementation and its impact on the socioeconomic conditions of beneficiaries in two states, Haryana and Orissa. Karnal district in Haryana, and Cuttack district of Orissa, were selected as case studies. About 57.25% of the programme beneficiaries were from scheduled castes and scheduled tribes. In Orissa, 93% of beneficiaries were poor, compared with only 36.5% in Haryana. Health care facilities and cattle insurance facilities were not adequately provided.

Nataraju (1989) studied the adoption of individual dairy management practices in Devanahally and Doddaballapur taluks of Bangalore district, Karnataka state, India, during 1981/82. He investigated the relationship between farmers' personal characteristics and their adoption levels, together with the problems they perceived in adopting recommended dairy management practices. Findings indicated that a large percentage of dairy farmers adopted animal management, health and breeding innovations. Feeding techniques were adopted to a medium

extent, while maintenance of records and cattle insurance practices were adopted by only a handful of respondents.

Shenoy and Raju (1989) reviewed the details of cattle insurance scheme and its performance when it was introduced as a compulsory component under the Integrated Rural Development Programme (IRDP) in Pune and Surat districts, Maharashtra and Gujarat, respectively. It was found that most beneficiaries under the scheme had little knowledge of its benefits, and the insurance agencies had not taken adequate steps to educate the rural poor about the scheme. Most beneficiaries were dependent on bank or other officials, or veterinary surgeons, to get their cattle insured. It was recommended that the following steps to be taken: the insurance companies and banks should publicize the scheme more; regular check-ups and vaccinations of cattle should be undertaken; the purchasing committee should ensure the purchase of healthy and breedable cattle; the quick settlement of claims is essential; the premium rate should be lowered; dairy cattle that are bank financed or covered by subsidy should be insured under a master policy; a separate scheme for individually owned cattle should be introduced.

The farmer is likely to allocate resources in profit maximizing way if he is sure that he will be compensated when his income is catastrophically low for reasons beyond his control. A farmer may raise more profitable crops and livestock even though they are risky. Similarly, farmer may adopt improved but uncertain technology when he is assured of compensation in case of failure (Hazell 1992).

As part of the Integrated Rural Development Programme and the Special Livestock Production Programme, the government of India introduced a cattle insurance scheme. The aim was to mitigate the risk/uncertainty associated with dairying. However the scheme has been greatly criticized for not offering comprehensive cover and for failing to deliver timely settlements. Using primary data from Andhra Pradesh and Tamil Nadu, Prasad and Rao (1992a) examined the milch animal insurance procedures, in order to identify factors that hinder the scheme's effectiveness. Recommendations for revision of current practice are articulated with respect to identification of the insured stock, streamlining claims

settlement, animal replacement, extending cover to include partial disability and maintenance of a sound database. It was further suggested that a corporation dealing exclusively with cattle insurance should be established.

Prasad and Rao (1992b) examined the procedures of milch animal insurance under the Integrated Rural Development Programme/Special Livestock Production Programme (IRDP/SLPP) in Andhra Pradesh (AP) and Tamil Nadu (TN), India, with a view to identifying the factors that held up claims settlements at various stages. 200 respondents from each district (60 SLPP and 340 IRDP beneficiaries) were interviewed. In AP and TN, respectively, 92 and 91% of claims studied were for animals that died or became permanently disabled within 12 months of being insured, 20 and 26% of claims arose from epidemics, 14 and 20% from natural calamities, and 22 and 25% from acute tympany; mean total time taken to settle claims was 146 and 82 days in Andra Pradesh and Tamil Nadu, respectively.

Alam *et al*. (1993) examined the livestock credit in Bangladesh. Four districts, namely Brahmanbaria, Mymensingh, Khulna and Rajshahi were covered. The survey drew data from 100 loanees in each district, 400 in all. Analysis of data showed that the demand for livestock credit had increased over time. The average size of loan was also increased. However, the average income per loan decreased. The analysis also shows that the small and medium farmers were the maximum recipients of livestock credit. The distribution of recipients was more or less proportional to the distribution of farm households among different farm sizes. Nevertheless, the average size of loan increased with the increase in farm size. The analysis shows further that the utilization of loans to productive channel was poor in all categories of farms. The repayment rate for credit was also very poor. Effective supervision for proper utilization of loans and for higher repayment rate is suggested. Large scale introduction of livestock insurance policy is also suggested for timely repayment of loan.

Jha and Prasad (1994) investigated the existing practices, costs and returns in cattle insurance in Asansol block in West Bengal, India. They found that the Integrated Rural Development Programme (IRDP) insurers undertook cattle

insurance only for bank-financed cattle, whereas general insurers insured mostly their crossbred and other graded cattle. Under the IRDP, the subsidized rate of premium minimized the costs and increased the cost benefit ratio. There were several costs in addition to the premium. The study suggests that to popularize cattle insurance, either the premium rate be lowered or subsidized by the government. Further, the claim procedure needs to be simplified.

Panday *et al.* (1997) examined the status and socioeconomic constraints on the adoption of pig farming in Haryana, India, and analyzed the economics of pig farming based on data collected from 16 landless and 14 landholding pig farmers in 1992/93. The major constraints were lack of proper market infrastructure, institutional loans, balanced and subsidized feed and veterinary health care. Housing conditions did not meet the prescribed standards and unsanitary conditions prevailed in the sheds. Heavy losses were also observed due to non-adoption of livestock insurance scheme.

Khan *et al.* (1998) examined the problems of farmers in Bangladesh and found that about 79% farmers faced problems in getting bank credit and 58% farmers did not get any treatment facilities. The greatest problem was disease which was 94%, then artificial insemination at 83% and the last, marketing of milk at 11%. Apart from these, there were also problems regarding breed, feed, vaccine, conception, milk processing, mortality, security and insurance.

A study undertaken by Torkamani (1998) to analyze the effects of agricultural insurance on productivity and risk attitude of farmers in Kavar district, Fars province, Iran, reveals that technical efficiency of insured group, on an average, was higher compared with non-insured group. The mean levels of technical efficiencies were 73.80 per cent and 65.09 per cent for insured and non-insured groups, respectively.

Based on fieldwork in southwestern Mongolia, Siurua and Swift (2002) examined the range of resources and strategies employed by herders to cope with catastrophic risk, including household winter stores, borrowing, 'moral economy' transfers, pensions, relief aid, and non-herding employment. Against the background

of economic liberalization and greater individual risk burdens due to the dismantling of social security safety nets, state service provision, and livestock insurance systems, the resilience of herding households is remarkable.

More than two third of land holdings are less than 2 hectares in India, the average size of holding is less than 1.55 hectares and more than half of the arable area is rain-fed and output from agriculture is largely conditioned by the monsoon. A properly designed and implemented agriculture insurance programme will protect the numerous vulnerable small and marginal farmers from hardship, bring in stability in the farm incomes and increase the farm production (Bhende 2002).

Ashalatha *et al*. (2003) reported that high cost of insurance premium (67.47%) was one of the major problems of the members of Krishna District Milk Co-operative Societies (India).

Champak *et al*. (2003) examined the use of camel vs. bullock-based farming systems in four zones of Thar desert (India). They found that bullock system required higher expenditure in terms of interest on investment, depreciation and expenses for the insurance of animals.

Turkylmaz *et al*. (2003) determined the effects of farmers' age, education level, family type, empathy, level of social participation, communication facilities, main occupation, work experience and living standards on the adoption level of innovations like modern housing systems, artificial insemination, pure breeding, ear tagging, animal insurance, automatic water dispensers, milking machines and silage and beet production and use in dairy enterprises in Aydn province. It was determined that these innovations were adopted by 25%, 55.3% and 19.7% small and medium scale enterprises to low, medium and high extents, respectively. They were adopted by 50% of large scale enterprises to a medium extent and by 50% to a high extent

Birthal and Rao (2004) revealed that smallholder livestock production needs policy support in terms of credit, insurance, technology, extension, markets, etc. There is a need to check the deterioration of common property resources through policy, legal and institutional means.

Dufhues et al (2004) discussed on the general feasibility of a livestock insurance scheme (LIS) in Vietnam. Qualitative data collection from four different types of insurance providers were selected for analyzing the supply side: 1. Insurance tied to credit within a state owned company, 2. Insurance tied to credit within a development project, 3. A state owned insurance company, 4. A private insurance company. By selection of these different insurance providers the variance of livestock insurances offered in Vietnam was covered. The main result is that offering sustainable livestock insurance was mostly hampered by unreliable data on livestock mortality and by politically low set premiums. The supply of LIS in the market was low and relates mainly to small-scale schemes or very limited regions. At the moment there was no insurer in Vietnam offering an area-wide, sustainable animal insurance scheme. Nevertheless, there was a demand for insuring credit financed livestock investments and there were many advantages of offering (compulsory) livestock insurance for rural lenders in Vietnam (protecting poor clients from risk, reducing lender's loan defaults, and earning additional income related to the loan portfolio). However, only sound and financially sustainable lenders should offer microinsurance services. It was highly recommended to involve by 'partnering' a professional insurer into this process. The most successful partner would probably be a private Vietnamese or foreign insurance company with existing experience in agricultural insurance as the state owned company Vietnam Insurance Corporation(BAOVIET) was not able to offer viable LIS in the past.

Ismea (2004) reviewed the development of livestock insurance in Italy and found that out of the 2,80,000 animals insured in 2003 against death, chronic illnesses, invalidity, abortion and loss of income for their owners, 83% were cattle and 17% were pigs.

Jansson *et al.* (2005) compared two ways of financing the programmes to combat Foot and Mouth Disease in the EU and used a simulation model to determine the welfare and production implications of the two systems. The two systems analyzed were: (1) a purely tax financed system, where all costs for preventive measures and combating FMD outbreaks were financed by the member state governments and

partly reimbursed by the EU; and (2) a compulsory insurance scheme where all costs were converted into regionally differentiated insurance premiums that are paid solely by the producers. Results of the Common Agricultural Policy Regional Impact Analysis (CAPRI) model showed that the quantitative effects of compulsory insurance on production were small, but net welfare was increased except in Denmark, Greece, Ireland, and the Netherlands (because of high-density production in those countries).

Mohammed and Ortmann (2005) conducted a survey of 74 commercial dairy farmers between November 2002 and February 2003 in three zobatat (zones) of Eritrea to identify factors that affect the adoption of livestock insurance. The results indicated that formal education of the farmer and the farmer's awareness of livestock insurance increased the probability of insurance adoption, whereas, farming experience, poor location and use of alternative risk management strategies, such as off-farm investments and farm enterprise diversification reduced the probability of livestock insurance adoption.

Rahji and Falusi (2005) reported the key determinants influencing poultry enterprises' participation in the Nigerian Agricultural Insurance scheme in Ibadan areas of Oyo state, Nigeria. The variables studied were: type of ownership, income, experience, credit access, adequacy of compensation, land ownership, distance to the insurance office, and scale of production. Evidence from the estimated model showed that eight out of the variables considered had significant impact on poultry farmers' decisions. Six of the variables had positive impact while the remaining two had negative influence on their probability of participation.

Singh and Singh (2005) reported the problems related to buffalo household milk producers in Etah district, Uttar Pradesh, India. A total of 150 milk producers in 10 villages were surveyed in 1995-1996. It was shown that health and management issues included problems in clean milk production, calving difficulties, insurance, helminthoses and deworming, proper treatment of diseases, housing and the lack of veterinarians. The incidence of these problems was higher in non-members compared to members of the Brooke Bond Lipton India Ltd. (BBLIL) Dairy Federation, indicating the positive impact of the Village Dairy Cooperatives (VDC) in the Etah district.

Ogurtsov *et. al.* (2006) analyzed the impact of farm and farmer characteristics on the acceptability to dairy farmers in the Netherlands of an all-risk insurance package and underlying specific categories of insurance coverage. The major farm characteristics considered were structural, operational and financial variables, while farmer age was the major farmer-specific characteristic analyzed. The specific insurance categories reviewed were damage, legal, disability, liability and health insurance. The results suggest that here are common and insurance-specific factors that can improve the design of insurance policies for dairy farmers.

The claims ratios for livestock insurance stand on the brink of un-profitability – the average for the last 5 years is 82%. If we consider that 15% of premiums are paid as commissions, and management expenses are another 10% of premiums, with other administrative costs 10%more, then the ratio of claims to premiums would stand at about 120% (Govt. of India, 2007).

2.4 WILLINGNESS TO PAY (WTP)

The CV (contingent valuation) method was originally proposed by Ciriacy-Wantrup, 1947, who was of the opinion that the prevention of soil erosion generates some 'extra market benefits' that are public goods in nature, and therefore, one possible way of estimating these benefits is to elicit the individuals' willingness to pay for these benefits through a survey method (Portney, 1994; Hanemann, 1991).

Bennett (1996) in his study chose 2000 people randomly in Great Britain to find out their concerns about the welfare of farm animals and their willingness to pay to support specific legislation to improve animal welfare. 43% of respondents were 'very concerned' and 46% 'somewhat concerned' about animal welfare; main concerns were housing and confinement, feed and medicines, transport and markers and slaughter. 62% had altered purchasing behaviour because of concerns (mainly by buying free range eggs and not consuming veal). 79% supported proposed legislation to phase out the use of battery cages and most were willing to support the legislation through increases in egg prices.

Mousing (1988) carried out a questionnaire survey of willingness to pay (WTP) of pig producers to the Danish Pig Health Scheme (DPHS). The result showed that, 33% producers would be prepared to pay a yearly DPHS subscription fee (i.e. positive WTP).

Onwujekwe *et al.* (1998) randomly selected 3 communities in Nigeria to take part in a study to determine the willingness to pay (WTP) for local Ivermectin distribution in a community financing framework. WTP was determined using a bidding game, and structured questionnaires were used to collect information on the household's socio-economic status, level of knowledge, priority ranking and perception of risk of contracting the disease. Multiple regression analysis was used to analyse factors associated with WTP. Between 92.1 and 93.3% of respondents were willing to pay amounts ranging from 5 Naira (US$ 0.06) to 100 Naira (US$ 1.25) (median: 20 Naira, US$ 0.25) in the 3 communities, which is more than 3 times the modelled unit direct cost of distributing Ivermectin by the communities themselves. Occupation of the respondent, marital status, average monthly expenditure on health care, manifestations of onchocerciasis, the type of savings scheme embarked on by the respondent, age-group, level of education and type of property were statistically significant ($P<0.05$) variables affecting WTP.

Randela *et al.* (2000) analyzed the factors influencing farmers' willingness-to-pay for dipping services as well as revealed preference for dipping frequency, using the multivariate and the logistic regression models by a cross sectional survey of 125 small-scale cattle farmers in the Venda region of Northern Province, South Africa. Empirical multivariate and logistic regression analysis showed that liquidity, human resource, satisfaction with the programme, and structure of production significantly influence farmers' willingness-to-pay. However, the most important factor influencing both the willingness-to-pay and the dipping frequency is liquidity (employment).

Chilonda and von Huylenbroeck (2001) in his study on willingness to pay for veterinary services on small-scale farmers in Eastern province, Zambia, following the change in livestock disease control policy (farmers now have to pay for the

veterinary services they receive) was found that they were using more therapeutic services than prophylactic services and willingness to pay for veterinary services was a critical issue for small-scale farmers.

Bennett *et al*. (2002) discussed the relationship between moral and economic values and the use of the contingent valuation method to estimate people's WTP of policy options with moral dimensions. An experimental survey of 120 undergraduate students was undertaken during 1998 to explore the links between the characteristics of a moral issue, the degree of moral intensity/moral imperative associated with the issue, and people's stated willingness to pay (WTP) for policy to address the issue. Two farm animal welfare issues (cage egg production and live animal exports) were chosen for comparison and the contingent valuation method was used to elicit people's WTP. The findings of the survey suggested that increases in moral characteristics do appear to result in an increase in moral intensity and the degree of moral imperative associated with an issue. Moreover, there was a positive link between moral intensity/moral imperative associated with an issue and people's stated WTP for policy to address the issue.

Sardana *et al*. (2002) done a contingent valuation survey of 100 farmers in Yamunanagar district, Haryana, India, clearly demonstrated the applicability of the contingent valuation method in the valuation of natural resources in a rural setting. The importance of natural resources (irrigation water, fodder, and fuelwood) as perceived by the farmers in the study area has been revealed through their willingness to pay (WTP) for these resources. High valuation of fodder in the study area speaks of its critical importance. The dependence of WTP for irrigation water on its resource base and cropping pattern shows a logical peasant behaviour. This had been made evident by the significant variations in WTP for fodder across different socioeconomic groups.

Ahuja *et al*. (2003) estimated the willingness to pay (WTP) for curative veterinary services in three states (Gujarat, Rajasthan and Kerala) in India. They addressed how much people were willing to pay for curative veterinary services and whether the willingness to pay increases/decreases with income. They used primary

data covering 1164 households drawn randomly from 76 villages across 19 districts of three states. A contingent valuation (CV) approach was adopted to estimate demand function. It covered two types of services (visits to the government veterinary centres, and the home units by a veterinarian). It was observed that a large proportion of households were opting for home services. For home service, a significant positive relationship between income and WTP was observed in Gujarat. In the other two states, such a relationship could not be established. For in-centre service, on the other hand, the WTP for government service was lower for poorer households in both Gujarat and Rajasthan states. Income levels, size and composition of livestock herds, do influence the WTP significantly.

Hooton *et al*. (2003) reported that those farmers with only a few cattle run a far higher risk of livestock disease causing a significant impact on their total holding, and thus had a great incentive to prevent any loss. Wealthier households can better afford occasional losses, and the relative value of CAHW services is no greater for these farmers than for the poorer cattle owners (when willingness to pay is expressed per head of cattle).

Vandermersch and Mathijs (2004) investigated the option of using a domestic origin certification to upgrade the value of milk. Data come from a consumer survey (with a total of 626 respondents) conducted in November 2003 at the three largest supermarket chains in Flanders (Belgium). Results showed evidence of a latent demand for domestic milk. Based on actually purchased brands in combination with preferred attributes, two consumer types were distinguished (price shoppers and added-value seekers), each with a different behaviour concerning domestic milk. Sociodemographic, attitudinal, and behavioural variables were found to influence the probability that a consumer is willing to pay a premium for domestic origin-certified milk. However, the influence of these variables differed between both consumer types as well as when a different bid level was proposed.

Budak *et al*. (2006) analyzed the willingness of Turkish consumers to pay for organically farmed sea bass (Dicentrarchus labrax). A contingent valuation survey was conducted during 2004 in six supermarkets in Adana, Turkey. Results indicated that 91.5% of the respondents would be willing to pay a premium for organically

farmed sea bass. Econometric results suggested that willingness to pay was mainly related to household income, education, food safety concerns, whether the respondent was the primary food shopper in household.

Chakraborty (2006) discussed the economic benefit from labelling milk and milk products and its impact on the supply and demand for fluid milk. The empirical estimate measures the economic value of milk market segmentation based on consumers' willingness to pay for hormone-free milk. The study uses 2002 survey data from Kansas households (n=660) and applied a Probit model for willingness-to-pay and an ordinary least square model for demand analysis. The empirical results showed that as long as consumers are willing to pay a higher price for bST-free milk, society would benefit from milk market segmentation.

Christensen *et al.* (2006) conducted a study to understand consumer risk perception and food choice in relation to food-related health risks, and how choices and preferences are influenced by expert information. The focus is on the attributes of food safety and animal welfare, represented by Campylobacter content and methods of breeding chicken, respectively. Choice experiments were used to measure consumer valuation of animal welfare and Campylobacter-free products in Denmark. A sample of 2300 respondents was used in the analysis. It was found that Campylobacter information did not affect the willingness to pay for either food safety or animal welfare and that breeding information had a great effect on the willingness to pay for animal welfare, but only a slight indirect effect on food safety through changes in the price sensitivity. Furthermore, a significant willingness to pay for food safety and animal welfare was revealed; the values of the two attributes were found to be interrelated.

Kathiravan and Thirunavukkarasu (2006) assessed the farmers' 'willingness to pay' (WTP) for bovine breeding services in Tamil Nadu, India. The districts of the state were categorized as 'livestock developed' (LD) and 'livestock under developed' (LUD) based on initial base line developed. The farmers in LD and LUD were willing to pay a maximum of Rs.116.39 and Rs. 139.29 for impregnating their cows and buffaloes, respectively, by availing of in-centre services, while they were ready to

offer Rs. 190.83 and Rs. 214.29 for the breeding services delivered at doorsteps. A significant difference in the WTP values was also noted between LD and LUD districts. The results indicated that the people were willing to pay more for getting their animals pregnant at the earliest and this amount was more than what the government was currently charging for insemination.

Otieno *et al*. (2006) collected data from 300 smallholder cattle farmers in Kakamega and Siaya districts of Western Kenya. Results of the study showed that most farmers (91.3%) were willing to participate in the cattle insurance scheme. Also, the farmers observed that the scheme would enable them to increase their herd sizes and change their breed composition. The farmer's mean Willingness to Pay (WTP) for the scheme would be determined by their gender, income, cultural norms, cattle breed and economic value/price of the animal kept.

Shaik *et al*. (2008) estimated willingness to pay for an insurance policy covering fish death loss. The survey was conducted across the United States; 268 producers completed the survey instrument, resulting in a response rate of 81 percent. Design of the contingent valuation method takes into account two coverage levels and four premium rates. Using standard willingness-to-pay techniques, they assessed the premium rate that producers with varying practices and regions were willing to pay for two different coverage levels of insurance. They found that producers apparently have an "effective" interest in insurance, that is, they are willing to pay for the product. In general, trout producers appear willing to pay premium rates of 2 to 11 percent for these coverage levels.

3 Research Methodology

This chapter explains the methodology adopted in this study which includes the research design, sampling procedure, variables and their empirical measurement, instruments and methods that were used for data collection and the statistical procedures used for the analysis of data. The details of research methodology adopted in this study are presented under the following heads.

3.1 Locale of the study

3.2 Sampling plan

3.3 Variables and their measurement

3.4 Data collection

3.5 Analysis of data

3.1 LOCALE OF THE STUDY

3.1.1 Selection of the State

Livestock sector has grown impressively in the state of Uttar Pradesh (U.P). Annually, the state produces more than 16 million tonnes of milk and over 116 thousand metric tones of meat from buffalo and small ruminants. In 2004-05, on an average 10.65 lakh kg of milk was being procured per day from 7.57 lakh members of 15686 Cooperative Milk Societies federated to 51 Milk Unions. In the Cooperative Sector, 4.60 lakh litres of milk was being sold per day in the State and another 5 lakh litres was being supplied to the National Milk Grid – Mother Dairy and Delhi Milk Scheme. Remaining milk was being processed and sold in the market as milk products. However, there were 172 units registered under Milk and Milk Product Act 1992 in the Private sector with an installed capacity of 77.99 lakh litre per day.

The National Livestock Insurance Scheme was implemented in 100 districts of all states except Goa in 2005-06. The state of Uttar Pradesh was selected for the study since U. P. is one of the leading producers of agriculture and livestock products. As per the 17th livestock census, U.P. had 8.2 per cent of total livestock population of India comprising 10 percent cattle, 23.4 per cent buffalo, 1.6 percent sheep, 10.4 per cent goat and 16.8 per cent pig population of India. U.P. has 1,763 veterinary hospitals / polyclinics, 268 veterinary dispensaries and 2313 veterinary aid centres / stockmen centre / mobile dispensaries. Further, the researcher hailed from the same state and was familiar with local language and local social setup, which was an added advantage in building up quick rapport with the respondents. It also enables the researcher to carry out an in-depth study combined with personal interview.

3.1.2 Selection of the District

Out of the 70 districts in U.P., National Livestock Insurance Scheme was functional in 12 districts. These 12 districts were Agra, Aligarh, Allahabad, Azamgarh, Barabanki, Budaun, Bulandshahar, Ghaziabad, Gorakhpur, Meerut, Moradabad and Muzaffarnagar. The above districts of U.P. are leaders in milk production and had a higher number of dairy animals i.e. cattle and buffaloes. From these 12 districts, Gorakhpur District was selected randomly for this study (Fig. 3.1).

3.1.3 Background information about Gorakhpur District

The district of Gorakhpur is located 265 Kms east of state capital Lucknow, on National Highway – 28; lies between Latitude 26° 46´ N and Longitude 83° 22´ E, covers geographical area of 3483.8 Sq. km. It is bounded by districts Mahrajganj in the north, Ambedkar Nagar, Azamgarh and Mau in the south, Kushinagar and Deoria in the east and Sant Kabirnagar in the west. It comprises of 7 tehsils, 19 blocks and 3,319 villages. According to 2001 census, the total population of the district was 37, 69,456 comprising of 19, 23,197 males (50.02%) and 18, 46,259 females (49.98%). The density of population in the district is 1,140 persons per sq. km (Fig. 3.2).

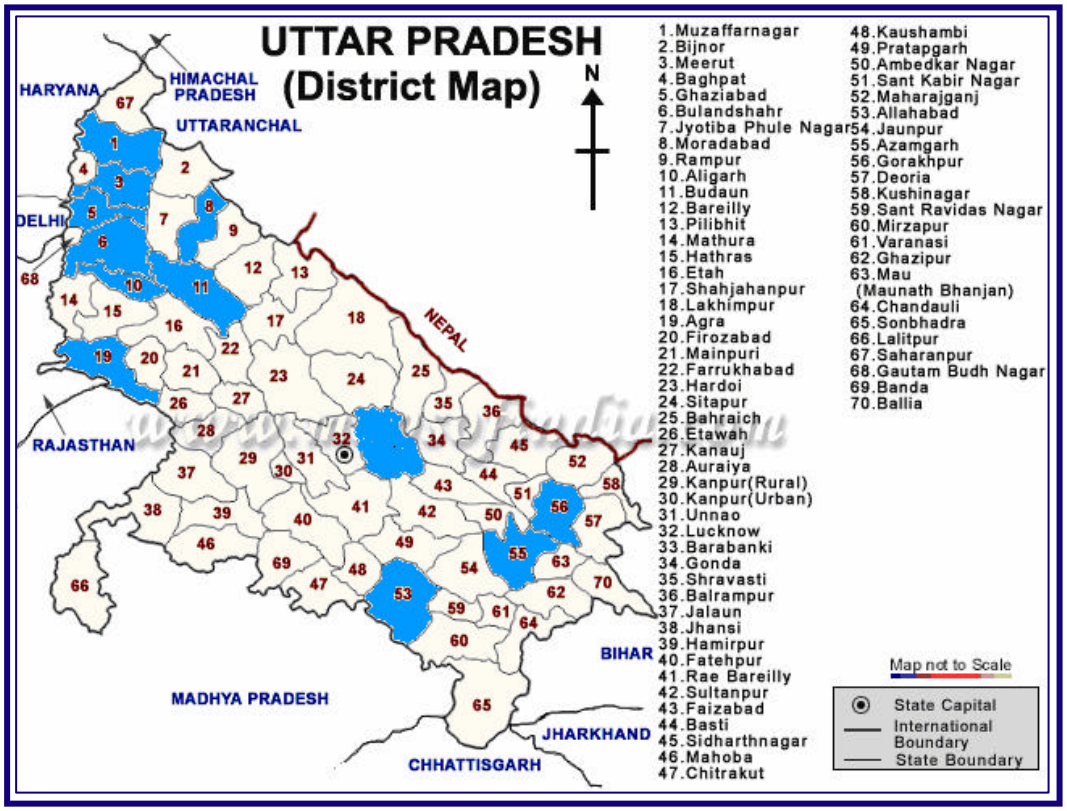


Fig. 3.1 : Map of Uttar Pradesh showing Gorakhpur district

Fig. 3.2 : Map of Gorakhpur district

3.2 SAMPLING PLAN

Two types of cattle and buffalo owners were selected, one group of the farmers who had insured at least one cattle or buffalo from their herd and the other group who had never insured their dairy animals. Lists of dairy farmers who had insured their animals were obtained from district veterinary office, veterinary offices at different blocks of the district and insurance companies working in the field of livestock insurance. From these lists, 120 dairy farmers who had insured their milch animals were selected randomly from all over the district. Likewise, 120 cattle and buffalo owners who had never insured their dairy animals were selected randomly. Thus, the ultimate sample comprised of 240 cattle and buffalo owners, which comprised of 120 respondents from each category.

Furthermore only those dairy farmers were selected for this study who owned at least 2 milch animals. A total of 30 respondents were selected randomly from the insurance agencies to know the constraints faced by insurance companies in cattle and buffalo insurance. Apart from primary data collected from the respondents, information from the secondary sources such as official records, discussion with different officials from bank, veterinary, insurance etc were also used for this study.

3.3 VARIABLES AND THEIR MEASUREMENT

Variables and their Measurement

S. No.	Variables	Measurements
1.	Age	Chronological age in completed years
2.	Education	Schedule
3.	Occupation	Schedule
4.	Land size	Actual land holding (in hectare)
5.	Herd size	Schedule
6.	Dairy farming experience	Schedule
7.	Material possession	Schedule

8.	Gross family income	In Rupees per year
9.	Extension agency contact	Schedule
10.	Mass media exposure	Schedule
11.	Sources of risk	Schedule
12.	Vulnerability of breeds to disease risk	Schedule
13.	Willingness to pay	Schedule
14.	Causes of claims	Schedule
15.	Time taken for settling the claim	Schedule
16.	Credit behavior	Schedule
17.	Problems in dairy animal insurance	Schedule

3. 3.1 Operational Definitions of Variables

3.3.1.1 Age

It is one of the basic characteristics of an individual linked with his maturity, physical well being, work efficiency and level of productivity. Here, it refers to the actual chronological age of the respondent in completed years at the time of investigation. The respondents were grouped into three categories according to their age as:

Young	:	(< 30 years)
Middle	:	(30-50 years)
Old	:	(> 50 years).

3.3.1.2 Gender

The respondents were categorized into male and female.

3.3.1.3 Education

It is operationalized as dairy farmers' ability to read, write and the formal education received by him/her. They were categorized as illiterate, can read and write only, primary, middle, high school, Intermediate and graduation or more.

3.3.1.4 Occupation

Occupation is operationally defined as the vocation in which a respondent spends major part of his/her time and attention. Occupation refers to one's usual or principal work or business especially as a means of earnings for the respondent. The respondents were enquired for primary and secondary occupation and categorized into five occupational group's viz. agriculture, government and private service or business.

3.3.1.5 Land size

This refers to the land owned by the respondents. The respondents were categorized into four categories viz. landless (no land), marginal (less than 2 hectare), small (2-4 hectare) and large (more than 4 hectare).

3.3.1.6 Herd size

It is operationally defined as the number of cattle & buffalo (including milch, dry, heifer, calves and draught bullocks) owned by the respondent.

3.3.1.7 Dairy farming experience

Dairy farming experience was operationalized as the duration (in years) of keeping dairy animals by the respondent. The dairy animal owners were grouped into four equal categories on the basis of minimum and maximum years of dairy farming experiences. The classes were: less than 6 years, 6-12 years, 12-18 years and more than 18 years.

3.3.1.8 Material possession

It is operationally defined as the ownership of household assets by respondents such as T.V., Radio, Motor cycle, Mobile and Car, which indicated his/ her level of living.

3.3.1.8 Gross family income (per annum)

This refers to the annual income in rupees from main and subsidiary income generating activities by the respondents and his family members. The annual income was divided into five income groups as given below:

Income group		Income per annum
Very low	:	<40,000
Low	:	Rs.40, 000-Rs. 80,000
Medium	:	Rs. 81, 000 to Rs. 120,000
High	:	Rs.121, 000 to 160,000
Very high	:	> 160,000

3.3.1.9 Extension agency contact

It is operationalized as the degree to which the respondent maintained contact with the formal organizations such as Agriculture/Bank/ Animal Husbandry Department/ NGO/Insurance Company.

3.3.1.10 Mass media exposure

It is operationally defined as the regularity of the respondents going through/ listening to/ watching to different media per week.

3.3.1.11 Sources of risk

It is operationally defined as the sources that cause shocks and stresses to the respondents of dairy farming. To get insight into a farmer's perception about risk attitude, a total 30 sources of risk were identified. Some statements were positively worded and some were negatively worded, for consistency check. The average score and standard deviation was calculated to know the dairy farmers' perception of different risk sources. Statements having standard deviations of less than 1 indicated that there was high level of consensus among respondents in regard to their perception of risk sources that are reflected in those statements.

3.3.1.12 Vulnerability of breeds to disease risk

It is operationally defined as the susceptibility of cattle and buffalo breeds to specific events/diseases. The vulnerability of various cattle breeds to disease risks was assessed by comparing their frequency of sickness and veterinary costs of treatment.

3.3.1.13 Willingness to pay

It is operationally defined as the amount non insured dairy animal owners are willing to pay for insurance of their animals. It is important to know which variables affect WTP for dairy animal insurance because this could help in assessing what factors may encourage people to buy insurance and at what price. Farmers who expressed their willingness to participate in the scheme were asked to state the exact amount of money that they would pay for each ticket. Those dairy farmers who were not willing to participate in this scheme were asked for the reason for non willingness.

3.3.1.14 Causes of claims

It is operationally defined as different types of claims made by the insured dairy animal respondents to the insurance company.

3.3.1.15 Time taken for setting the claim

It is operationally defined as total time taken by the insurance company to settle the claim made by the insured dairy animal owners.

3.3.1.16 Credit behavior

It is defined as the total time and number of visit by the respondents for credit to different agencies for procurement of dairy animals and equipments.

3.3.1.17 Problems in dairy animal insurance

Problems are operationalized as the constraints that are faced by the dairy farmers and insurance companies in cattle and buffalo insurance. These problems need to be solved for the benefit of dairy farmers.

3.4 DATA COLLECTION

The background information about the study area was obtained through consultation with the key informants and available secondary sources. The process also helped in rapport building with local people, which enabled them to express and generate information reliably and in a relaxed atmosphere. All the respondents

were personally interviewed in the local language i.e. Hindi. A semi structured interview schedule was developed keeping in mind the objectives of the study and for measurement of different variables. The schedule was pre-tested in two sessions with 5-10 dairy farmers in each session. After each session the questions were modified according to the comments and suggestion of the farmers. The schedule was finally administered for collection of data from the selected respondents through personally interviewing them and Focus Group Discussions (FGDs). Primary data focused on (1) socioeconomic characteristics of the dairy farmer and farm, (2) sources of risks perceived by the dairy farmers (including questions on sources of risk, risk attitude, risk management strategies and dairy farmers' goals), (3) particulars about dairy animal insurance and claim procedure, (4) willingness to pay (WTP) for cattle insurance scheme as well as (5) existing problems in dairy animal insurance (including problems faced in getting bank loan, claim procedure, insurance agency and satisfaction with different aspect of livestock insurance).

Apart from the primary data collected from the respondents, information from official records etc and information also gathered from discussion with officials involved in livestock insurance were also used in the study.

The questions, which were used to know the dairy farmers' perception about sources of risk, risk attitude and risk management strategies, were mostly closed type mainly in the form of Likert-type scales with a continuum of 1 to 5 (Schuman and Presser, 1981; Churchill, 1995). For eliciting willingness to pay, following animal insurance scheme was presented to the farmers:

This cattle and buffalo insurance scheme was to compensate farmers almost the full value (80% – 100%) of their animals after verifying that the cause of their animals' death was not due to personal negligence or poor management. The scheme was sold through membership tickets per animal per year at different prices for a maximum of 5 years (useful productive period) in the life of an animal. Farmers were then asked whether they will buy the ticket. Farmers who expressed their willingness to participate in the scheme was asked to state the exact amount of money that they would pay for each ticket, as well as the cattle breeds and number of animals that they would insure in such scheme.

3.5 ANALYSIS OF DATA

The information collected from both the primary and secondary sources was summarized and useful inference was drawn as per the objectives of the study. Both descriptive and quantitative methods were used to analyze data. Descriptive data was analyzed using frequency tables and percentages.

Functional analysis was attempted to see the effect of different independent variables on WTP. WTP data on insurance was analyzed by using Ordinary Least Squares (OLS) regression. The mean WTP for the cattle insurance scheme was computed from the prices specified by the respondents, using the simple average method (Equation 1).

$$\text{Mean WTP} = \frac{\Sigma Xi}{N} \qquad (1)$$

Where Xi = WTP for insurance scheme by the ith respondent, N = total number of respondents willing to participate in the insurance scheme.

The main factors that determine farmers' WTP for the cattle insurance scheme was analyzed by using the OLS method (Equation 2).

$$Y = \gamma 0 + \gamma 1X1 + \gamma 2X2 + \gamma 3X3 + \gamma 4X4 + \text{————————} \gamma nXn + \omega \qquad (2)$$

Where, Y = Amount of money a farmer would be willing to pay for each insurance ticket, $\gamma 0$ = constant term, X1 = gender of the farmer (0 = female, 1 = male), X2 = Household's total monthly income, X3 = Amount of money a farmer is willing to spend on the next cattle that he/she wishes to buy (price or value of animal), X4 = Breed of cattle a farmer would buy next (0 = crossbreed/grade, 1= Local zebu), ω = Error term which accounts for all random disturbances and omitted variables in the estimated model, , while $\gamma 1$, $\gamma 2$, $\gamma 3$ and $\gamma 4$ are coefficients representing the marginal effects of the respective independent variables on the mean WTP.

4 Results and Discussion

This chapter presents the findings of the study and the whole chapter is divided into different sections according to objectives. The study was conducted on 240 respondents, i.e. dairy farmers, in which half of the respondents insured their dairy animals and other half of the respondents did not insure their dairy animals. The results are discussed separately for these two categories of respondents. The first section describes the socio-economic profile of the respondents. Section two describes the dairy farmers' perception about different sources of risk, their risk attitude and risk management strategies. Section three describes the dairy farmers' willingness to pay for livestock insurance. Section 4 describes factors related to cattle and buffalo insurance and constraints in cattle and buffalo insurance. Last section discusses suggestions and policy implications of the study to improve the delivery of livestock insurance among dairy farmers.

4.1. SOCIO-ECONOMIC PROFILE OF THE RESPONDENTS

4.1.1. Age of the dairy farmers

Distribution of dairy farmers according to their age showed that around 70 per cent respondents belonged to middle age group, i.e. 30 to 50 years, 17.5 per cent to old age group (>50 years) and only 12 per cent dairy farmers to young age group (<30 years). In both the categories, i.e. non-insured and insured dairy farmers, largest proportion of farmers belonged to middle age group (65 per cent and 76 per cent, respectively, for non-insured and insured dairy farmers) (Fig. 4.1).

Around 21 per cent of non-insured and 14.2 per cent of insured respondents belonged to old age group, while only 14 per cent non-insured and 10 per cent insured respondents belonged to young age group. Table 1 shows that insured respondents were more in middle age group than non-insured dairy animal owners. The mean age were 40.7 for non-insured and 42 for insured dairy animal owners, respectively.

Table 1: Distribution of respondents according to their age

Age group	Non-insured	Insured	Total
<30	17(14.2)	12(10)	29(12.1)
30-50	78(65)	91(75.8)	169(70.4)
>50	25(20.8)	17(14.2)	42(17.5)
Total	120 (100)	120(100)	240(100)

Figures in parentheses indicate percentage

It can be inferred from the above that insurance coverage was more in middle age group than old age group. It shows general awareness about insurance was more in middle age group and they are more inclined to adopt cattle and buffalo insurance. The reason behind this may be due to awareness programme for insurance schemes run by the government and animal husbandry departments was mostly adopted by young and middle age group farmers.The comments of Somasekharan (1980) that in today's world of modernization the younger generation have more scientific orientation and adopt more number of practices does hold true in this case where cattle and buffalo insurance is followed more by middle and young aged dairy farmers.

4.1.2 Gender of the dairy farmers

Table 2 shows that out of 240 dairy farmers, 69 per cent respondents were male, whereas, only 31 per cent were female. In the non-insured category, 71 per cent and 29 per cent of respondents were male and female, whereas, in the insured category 67 per cent and 33 per cent of respondents were male and female,

respectively. It is thus evident that percentage of female respondents was slightly more in insured group than non insured category.

Table 2: Distribution of respondents according to their gender

Gender	Non-insured	Insured	Total
Male	85 (70.8)	80(66.7)	165(68.8)
Female	35 (29.2)	40(33.3)	75(31.2)
Total	120 (100.0)	120(100)	240(100)

Figures in parentheses indicate percentage

This trend might be due to different dairy schemes operated in the study area by the government to improve the condition of females in the villages. These results are in conformation with the results of Adhikari (1987). The NGO proshika's experiences from Bangladesh (Haq and Mallik, 2002) also suggested that women are able to operate and manage technical enterprises like animal husbandry efficiently with high returns.

4.1.3 Educational level

It can be seen from Table 3, that in the non-insured category 19 per cent were illiterate, 16 per cent were only able to read and write, 22.5 per cent each were educated up to primary and middle school, 8.5 per cent were educated up to high school, 7.5 per cent were educated up to intermediate level and 4.2 per cent were graduates. The proportion of insured respondents belonging to the above education categories in the same order were 22, 21, 20, 12.5, 10 and 7.5 per cent, respectively. If we see the level of education among all the dairy farmers then nearly equal number of respondents was illiterate, had primary school and middle school level of education. Proportion of illiterate respondents was more in insured category than the non insured category. Graduates were more in insured category than the non-insured category (Fig. 4.2).

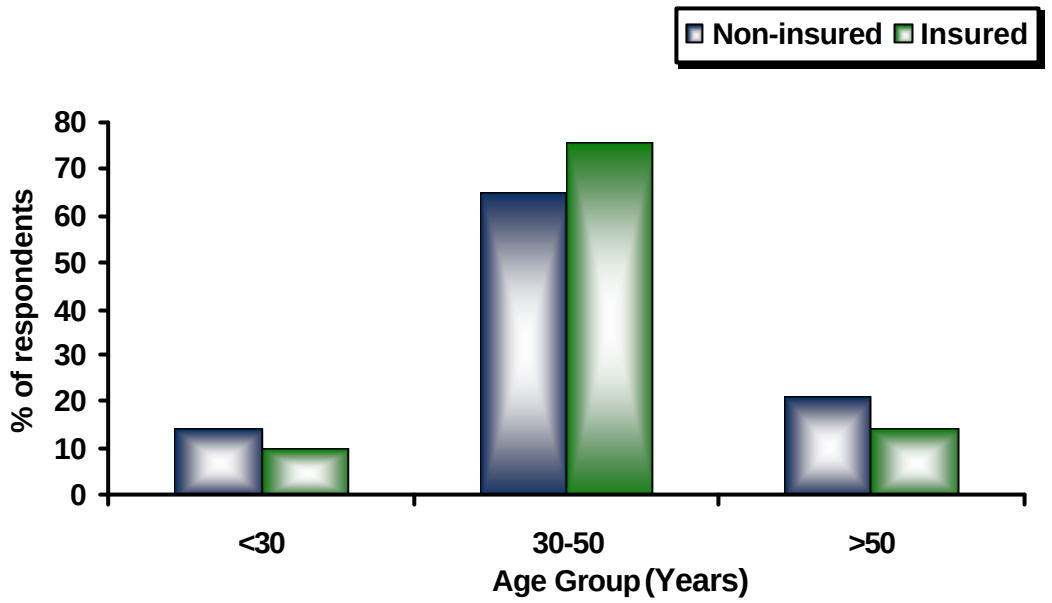


Fig. 4.1 : Age of respondents

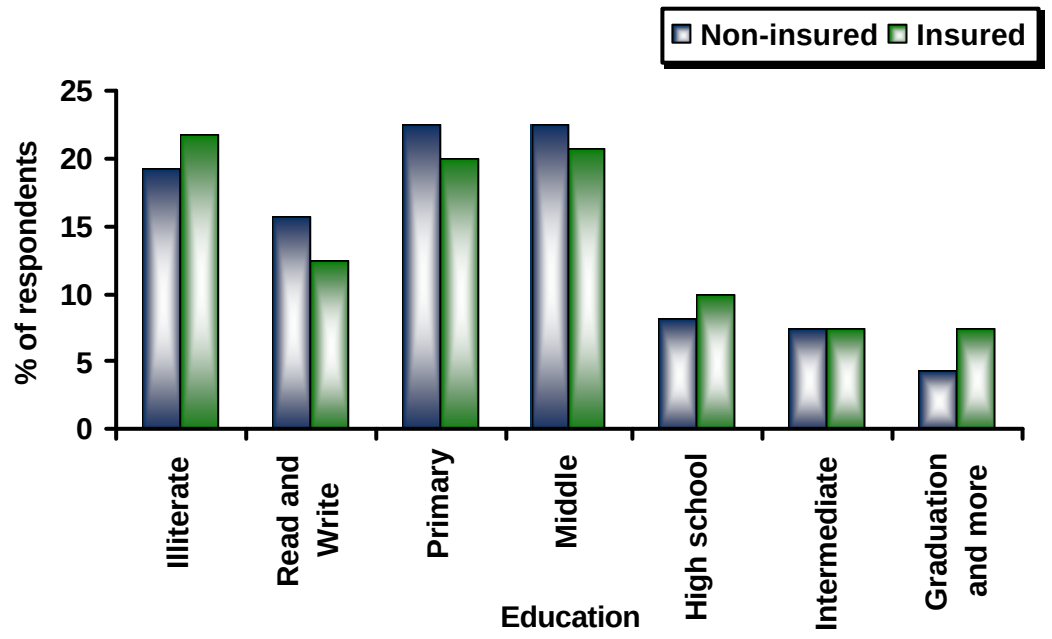


Fig. 4.2 : Educational status of dairy farmers

Table 3: Distribution of respondents according to their education level

Edcuation	Non-insured	Insured	Total
Illiterate	23(19.2)	26(21.7)	49(20.4)
Read and Write	19(15.8)	15(12.5)	34(14.2)
Primary	27(22.5)	24(20)	51(21.3)
Middle	27(22.5)	25(20.8)	52(21.7)
High school	10(8.3)	12(10)	22(9.2)
Intermediate	9(7.5)	9(7.5)	18(7.5)
Graduation and more	5(4.2)	9(7.5)	14(5.8)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.4 Religion of the respondents

Around 84 per cent of dairy farmers belonged to Hindu community, whereas, 16.2 per cent belonged to Muslim religion (table 4). Among non-insured group of dairy farmers 82.5 per cent and 17.5 per cent were from Hindu and Muslim community respectively. Eighty five per cent and 15 per cent of insured respondents belonged to Hindu and Muslim communities, respectively.

Table 4: Distribution of respondents according to their religion

Religion	Non-insured	Insured	Total
Hindu	99(82.5)	102(85)	201(83.8)
Muslim	21(17.5)	18(15)	39(16.2)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.5 Caste of the dairy farmers

Majority of the dairy farmers belonged to backward class (53 per cent) followed by general category (43 per cent). Small percentage of the dairy farmers was schedule caste (4 per cent). Other backward class and general category respondents were more in insured group than the non-insured group.

Table 5: Distribution of respondents according to their caste

Caste	Non-insured	Insured	Total
General	51(42.5)	52(43.3)	103(42.9)
Other backward class	63(52.5)	65(54.2)	128(53.3)
Schedule cast	6(5.0)	3(2.5)	9(3.8)
Schedule tribe	0(00)	0(00)	0(00)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.6 Number of dependents

Most of the dairy farmers (77 per cent) reported that they had three to five dependents, whereas, 16 per cent respondents had more than 5 dependents. Proportion of households with more than 5 dependents was more in insured group (23 per cent) than non-insured category (9 per cent). In contrast greater proportion (10 per cent) of non-insured households had less than 3 dependents as compared to the insured category (3 per cent) (Fig. 4.3).

Table 6: Distribution of respondents according to no. of dependents

No. of Dependents	Non-insured	Insured	Total
<3	12(10)	4(3.3)	16(6.7)
3-5	97(80.9)	88(73.3)	185(77)
>5	11(9.1)	28(23.3)	39(16.3)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.7 Occupation

The main occupation of vast majority (82 per cent) of all the respondents was agriculture. Private job holders were more (17 per cent) among insured group than among the non-insured dairy animal owners (10 per cent). Only 4 per cent from non-insured category and 6 per cent from insured category had government jobs. Overall, 13 per cent and 5 per cent of all respondents were engaged in private jobs and government jobs, respectively. Kurup (2003) had also observed that agriculture remains primary source of income for most of the farmers in Orissa, whereas, Ouma *et al* (2003) found that mixed system could enhance the competitiveness of the farmers.

Table 7: Distribution of respondents according to occupation other than dairying

Occupation other than dairying	Non-insured	Insured	Total
Government job	5(4.2)	7(5.8)	12(5)
Private job	12(10)	20(16.7)	32(13.3)
Agriculture	103(85.5)	93(77.5)	196(81.7)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.8 Land holding

Table 8 depicts the distribution of respondents according to their land holdings. The table shows that respondents belonging to non-insured respondents mostly had less than 2 hectare land (51 per cent), whereas, 41 per cent and 5 per cent of the respondents in this category were small (2-4 ha) and large (>4 ha) land holders, respectively. Only 3 per cent non-insured dairy farmers were landless. Respondents of insured category were mostly small (46 per cent) and marginal (39 per cent) land holders, and 11 per cent respondents of this category were large farmers. Small and marginal land holding among all the dairy farmers were more or less same (i.e. 43 per cent and 45 per cent, respectively). Only 8 per cent respondents fells under large farmers and 4 per cent belonged to landless category.

Table 8: Distribution of respondents according to their land holding

Land holding	Non-insured	Insured	Total
Landless(0 ha)	4(3.3)	5(4.2)	9(3.8)
Marginal (<2ha)	61(50.8)	47(39.1)	108(45)
Small (2-4ha)	49(40.8)	55(45.8)	104(43.3)
Large (>4ha)	6(5)	13(10.8)	19(7.9)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

The land holding was higher with the dairy farmers who had insured their animals compared to the non-insured dairy farmers. The number of large land holder was more among insured animal owners than the non-insured animal owners. High land holding had a positive effect on the insurance purchase because the respondents who insured their animals had more land holding. The mean land holding were 2.26 and 2.01 hectare for insured and non-insured dairy respondents. Sinha (1997) reported that percentages of illiteracy level decreased and literacy beyond metric level increased with land holding size in rural areas of Nalanda district in Bihar.

4.1.9 Extension agency contact

All the respondents were in contact with the bank, whereas, 80 per cent, 54.6 per cent and 62.1 per cent respondents were in contact with the animal husbandry department, agriculture department and insurance agency, respectively. All the insured dairy animal owners were in touch with animal husbandry department, whereas, only 60 per cent of non-insured dairy animal respondents were in contact with animal husbandry department. Only 24.2 per cent non-insured dairy animal respondents were contacted by insurance agency. The importance of contact with service provider in ensuring uptake of any new technology/service was earlier reported by Okine (1993) who pointed out that due to the lack of contact between extension officers and rural women new technology was not transferred to them.

Table 9: Distribution of respondents according to extension agency contact

Extension agency contact	Non-insured	Insured	Total
Agri Department	47(39.2)	84(70)	131(54.6)
Bank	120(100)	120(100)	240(100)
A.H.Dept.	72(60)	120(100)	192(80)
Insurance Agency	29(24.2)	120(100)	149(62.1)
NGO	37(30.8)	47(39.2)	84(35)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.10 Material possession

Higher proportion of non-insured respondents owned various assets, as compared to their insured counterparts, except in the case of car and mobile (table 10). If ownership of household assets is taken as a proxy for household income, it seems that government insurance scheme in the study area has mainly targeted dairy farmers from low income group.

Table 10: Distribution of respondents according to material possession

Material possession	Non-insured	Insured	Total
T.V.	71(59.2)	64(53.3)	135(56.3)
Radio	69(57.5)	60(50)	129(53.8)
Motor cycle	56(46.7)	40(33.3)	96(40.0)
Mobile	52(43.3)	53(44.2)	105(43.8)
Car	1(0.8)	12(10)	13(5.4)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.11 Mass media exposure

The exposure of mass media was more among insured dairy animal respondents than the non insured dairy animal farmers. About 37.5 per cent of insured and 12 per cent of non-insured respondents had more than 8 hours per week exposure to different mass media. Mostly (46 per cent) respondents had 5 to 8

hours/week exposure to mass media. The average mass media exposure was 5.54 hr/week and 8.2 hr/week for non-insured and insured dairy animal farmer, respectively.

Table 11: Distribution of respondents according to mass media exposure

Mass media exposure (hr/wk)	Non-insured	Insured	Total
<5hr	47(39.2)	23(19.2)	70(29.2)
5-8hr	59(49.2)	52(43.3)	111(46.3)
>8hr	14(11.7)	45(37.5)	59(24.6)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.12 Dairy farming experience

Table12 indicates that 42.5 per cent non-insured and around 32 per cent insured dairy animal respondents had 6 to 12 years of experience in dairying. Around 47 per cent and 17 per cent insured dairy animal respondents had 12 to 18 years and more than 18 years of dairy farming experience, respectively (Fig. 4.4).

Table 12: Distribution of respondents according to dairy farming experience

Dairy farming experience (years)	Non-insured	Insured	Total
<6	16(13.3)	6(5)	22(9.2)
6-12	51(42.5)	38(31.7)	89(37.1)
12-18	39(32.5)	56(46.7)	95(39.6)
>18	14(11.7)	20(16.7)	34(14.2)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

The average dairy farming experience for non-insured respondents was 12 years, whereas, the same for insured dairy animal owners was 14 years. In case of all the dairy farmers 40 per cent and 37 per cent had 12 to 18 and 6 to 12 years dairy

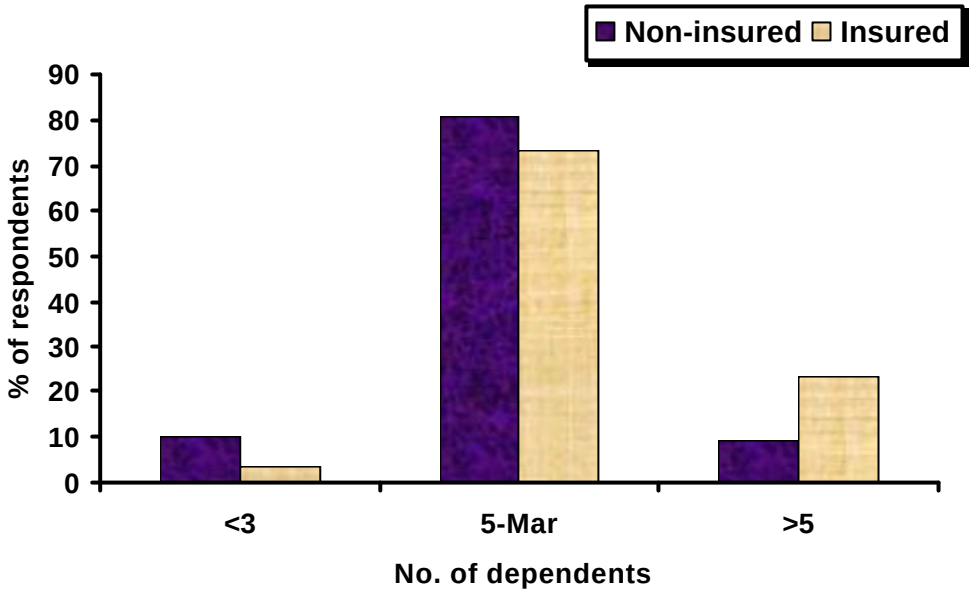


Fig. 4.3 : Number of dependents

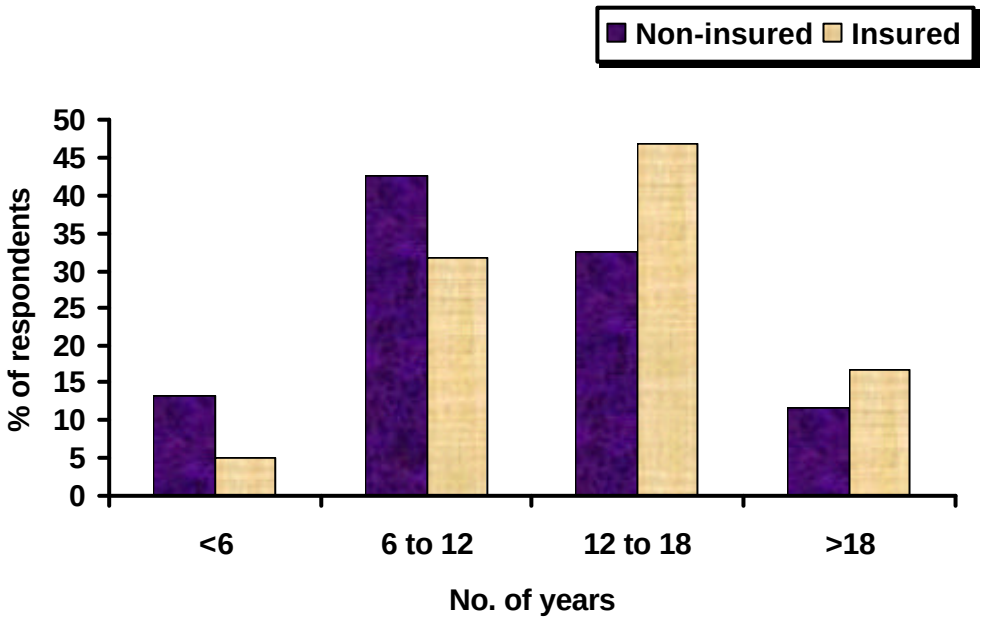


Fig. 4.4 : Dairy farming experience

farming experience, respectively. It clearly indicates that average dairy farming experience of insured respondents was more than that of non-insured respondents. The higher dairy farming experience seems to some positive effect on cattle and buffaloes insurance.

4.1.13 Number of male cattle and buffalo

More or less same proportion of respondents belonging to the two groups owned male animals (table 13). For all the respondents, about 51 per cent owned 1-2 male cattle and buffalo, whereas, 41 per cent respondents did not own any male animal. Only 7.5 per cent of the respondents had more than 2 male animals. Lesser number of male cattle and buffalo owned by the respondents was due to reason that dairy animals were mainly reared for milch purpose, rather than draught purpose for their agricultural work.

Table 13: Distribution of respondents according to male Cattle and Buffalo

No. of male cattle and buffalo	Non-insured	Insured	Total
No male animal	53(44.2)	46(38.3)	99(41.3)
1-2	59(49.2)	64(53.4)	123(51.3)
>2	8(6.7)	10(8.3)	18(7.5)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.14 Breed of dairy cattle and buffalo

Table 14 also shows that about 64 per cent, 52.5 per cent and 87.5 per cent of non-insured respondents owned indigenous cow, crossbred cows and buffaloes respectively. Proportions of insured dairy animal owners owning indigenous cow, crossbred cows and buffaloes were 41 per cent, 37 per cent and 83 per cent, respectively. Overall, 88 per cent of respondents had buffalo as a dairy animal. In both the categories, buffalo was the main dairy animal. Proportion of respondents owning

crossbred cow and buffalo in non-insured group (52.5 and 87.5 per cent, respectively) was more than that in the insured group (37 and 83 per cent, respecitvely).

Table 14: Distribution of respondents according to type of dairy animal

Type of dairy animal	Non-insured	Insured	Total
Cow-indigenous	77(64.2)	49(40.9)	126(52.5)
Cow crossbred	63(52.5)	44(36.7)	107(44.6)
Buffalo	105(87.5)	106(83.3)	211(87.9)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.15 Distribution of respondents according to herd size

Around 64 and 41 per cent of non-insured and insured respondents had indigenous cow in their herd, respectively. Around 58.5 per cent owners who did not insure their dairy animal had 2-3 indigenous cow, whereas, it was 63 per cent in case of insured dairy animal farmers. Generally both the groups had less than 4 indigenous cows. Only 2.6 per cent from non-insured and 4 per cent from insured categories had more than 3 indigenous dairy animals.

Around 53 per cent and 37 per cent non-insured and insured dairy animal farmers had crossbred cows. Overall, 46.6 per cent respondents had crossbred cows. Nearly equal percentage of dairy farmers among non insured and insured respondents had 2-3 cross bred cows. More than 3 crossbred cows owned by insured respondents were high (11 per cent) than the non-insured respondents (5 per cent). Percentage of non-insured dairy animal owners (41 per cent) were more in case of less than 2 crossbred cow than insured category (34 per cent). 11 per cent insured dairy animal owners had more than 3 crossbred cows, whereas, it was 5 per cent in case of non-insured dairy animal respondents.

Table 15: Distribution of respondents according to herd size owned

Herd size	Non-insured	Insured	Total
Herd size of indigenous cow			
No. of respondents	77	49	126
No. of indigenous cow			
<2	30(39)	16(32.7)	46(36.5)
2-3	45(58.5)	31(63.3)	76(60.3)
>3	2(2.6)	2(4.1)	4(3.2)
Herd size of cross-bred cow			
No. of respondents	63	44	107
No. of Crossbred cow			
<2	26(41.3)	15(34.1)	41(38.3)
2-3	34(54)	24(54.5)	58(54.2)
>3	3(4.8)	5(11.4)	8(7.5)
Herd size of Buffaloes			
No. of respondents	105	106	211
No. of buffalo			
<4	52(49.5)	46(43.4)	98(46.4)
4-8	43(41)	46(43.4)	89(42.3)
>8	10(9.5)	14(13.2)	24(11.4)

Figures in parentheses indicate percentage

Nearly equal percentage of respondents (88 per cent) among non-insured and insured dairy animal owners had buffalo as a main dairy animal in their herd. Table 15 clearly indicates that 49.5 per cent, 41 per cent and 9.5 per cent non-insured dairy animal farmers had less than 4, 4 to 8 and more than 8 buffaloes in their herd, respectively. The percentage of respondents among insured group, who had more than 8 buffaloes was quite high than the non-insured group. Equal percentage of insured dairy animal owners (43 per cent) had less than 4 and 4 to 8 buffaloes. Overall, 42 per cent respondents had 4 to 8 buffaloes, whereas, 46 per cent dairy farmers had less than 4 buffaloes. Only 11 per cent dairy farmers among all the respondents had more than 8 buffaloes.

4.1.16 Milk productivity and production of indigenous cow

Sixty six per cent of non-insured and 78 per cent of insured dairy farmers got 2-3 liter milk/day from each indigenous cow. Only 8 per cent non-insured and 12

per cent insured respondents reported more than 3 liter milk production per day per animal. Overall 71 per cent respondents who had indigenous dairy cows claimed 2-3 liter milk production/day/animal (Fig. 4.5).

Table 16: Milk productivity and production of Indigenous cow

Milk production of indigenous cow	Non-insured	Insured	Total
No. of respondents	77	49	126
Production (lit/day/animal)			
<2	20(26)	5(10.2)	25(19.8)
2-3	51(66.2)	38(77.6)	89(70.6)
>3	6(7.8)	6(12.2)	12(9.5)
Annual production (lit/animal)			
<900	28(36.4)	20(40.8)	48(38.1)
900-1200	46(59.7)	29(59.2)	75(59.5)
>1200	3(3.9)	0(00)	3(2.4)
Total production per year (lit)			
<1500	31(40.3)	17(34.7)	48(38.1)
1500-2000	30(39)	26(53.1)	56(44.4)
2100-2500	9(11.7)	1(2)	10(8)
>2500	7(9)	5(10.2)	12(9.5)

Figures in parentheses indicate percentage

Annual milk production of 900 – 1200 liter from each animal was reported by around 59 per cent of respondents from both groups (i.e. non-insured and insured respondents). None of the respondents having insured dairy animal claimed more than 1200 liters milk production/ animal/annum, whereas, 4 per cent non-insured dairy animal owners reported that they got more than 1200 liter milk/animal/annum. 60 per cent dairy farmers' claimed 900-1200 litres milk production/animal/annum. Around 41 per cent insured and 36 per cent non-insured farmers reported less than 900 liter milk production per animal per year. It is nearly equal to national average. Fifty three per cent insured and 39 per cent non-insured respondents claimed that they got 1500 to 2000 liter total milk per year through indigenous cows, whereas, 40 per cent and 35 per cent non-insured and insured respondents, respectively reported

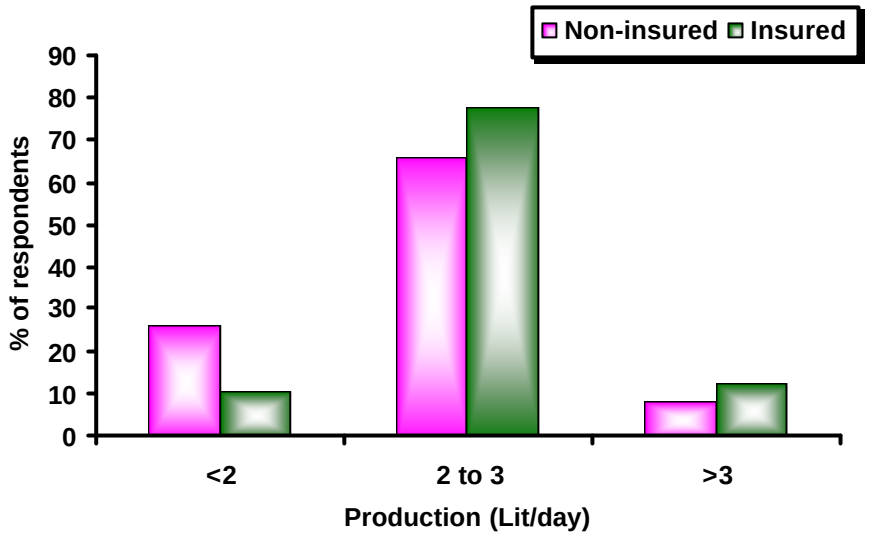


Fig. 4.5 : Milk production of indigenous cow (lit/day)

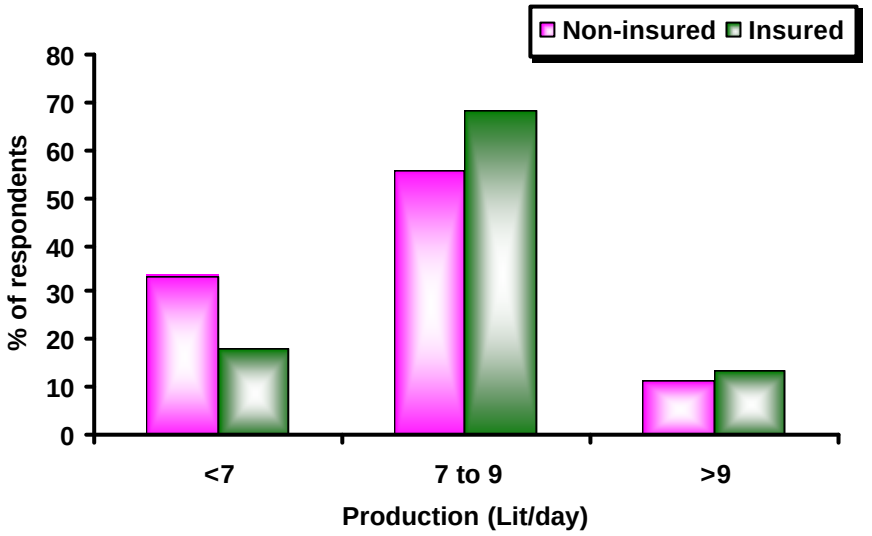


Fig. 4.6 : Milk production of crossbred cow (lit/day)

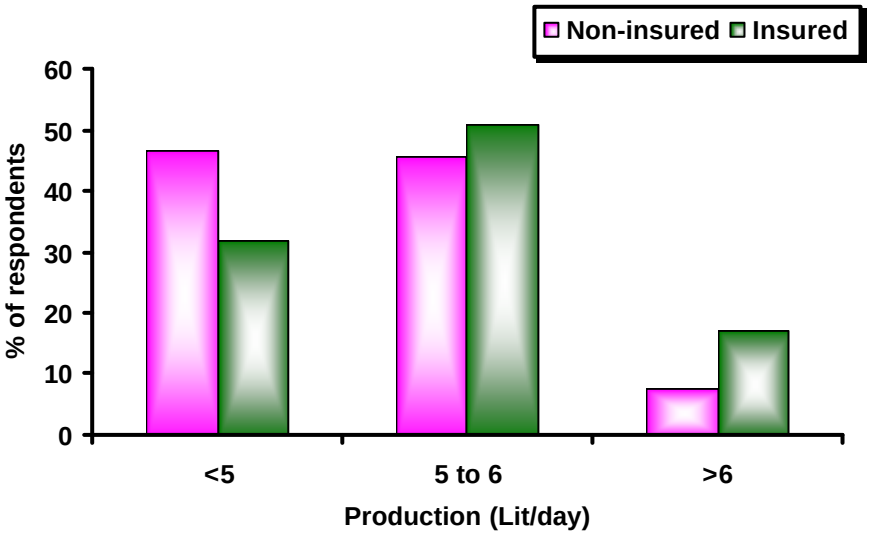


Fig. 4.7 : Milk production of buffalo (lit/day)

less than 1500 liter milk production from their indigenous cows. Overall, 38 and 44 per cent respondents reported less than 1500 litre and 1500-2000 liters total milk production, respectively from their indigenous herd.

4.1.17 Milk productivity and production of crossbred cows

The data given in Table 17 reveals that around 68 per cent insured and 55.5 per cent non-insured respondents reported 7-9 liters of milk production per day from each crossbred animal. More than 9 liters of milk production/day/animal was reported by 11 per cent non-insured and 14 per cent insured group of respondents. The percentage of respondents who reported less than 7 liters milk production/ animal/day were more (33 per cent) in non-insured than insured (18 per cent) respondents. Overall, 61 per cent respondents reported that they obtained 7-9 liters of milk per day per crossbred cow (Fig. 4.6).

Table 17: Milk productivity and production crossbred cows

Milk production of crossbred cow	Non-insured	Insured	Total
No. of respondents	63	44	107
Production (lit/day/animal)			
<7	21(33.3)	8(18.2)	29(27.1)
7-9	35(55.5)	30(68.2)	65(60.7)
>9	7(11.1)	6(13.6)	13(12.1)
Annual production (lit/animal)			
<2100	17(27)	3(6.8)	20(18.7)
2100-2500	36(57.1)	21(47.7)	57(53.3)
>2500	10(15.9)	20(45.4)	30(28)
Total production per year (lit)			
<2500	17(27)	2(4.5)	19(17.8)
2500-4000	14(22.2)	11(25)	25(23.4)
4100-6000	23(36.5)	15(34)	38(35.5)
>6000	9(14.3)	16(38.6)	25(23.4)

Figures in parentheses indicate percentage

The total annual production of 2100-2500 liters of milk per crossbred cow was reported by 57 per cent and 48 per cent non-insured and insured respondents, respectively. The percentage was quite high (45 per cent) among insured dairy animal owners who claimed more than 2500 liters of milk production per annum by each crossbred cow, whereas, only 16 per cent non-insured respondents reported this much higher production. Overall, 53 per cent respondents reported 2100-2500 liter milk production per annum from each crossbred cow. The total annual production from dairying with crossbred cows was more than 6000 liters, claimed by 39 per cent respondents of insured group, whereas, this was only 14 per cent in non-insured group. Nearly equal percentage (35 per cent) of respondents from both the group reported 4100 to 6000 liters of milk production from dairying with crossbred cows. Overall, 35.5 per cent respondents reported that 4100-6000 liters and equal percentage of respondents (23 per cent) reported 2500-4000 liters and more than 6000 liter milk production annually by dairying through crossbred cows.

4.1.18 Milk productivity and production of buffaloes

Around 46 per cent and 51 per cent insured respondents claimed 5 to 6 liter of milk production per day from every buffalo. Seventeen per cent from insured and 8 per cent from non-insured respondents reported more than 6 liter of milk production per day per buffalo. Overall, 48 per cent respondents reported 5-6 liter milk production/day/buffalo.

The annual 1400 to 1800 liter milk production from buffaloes was reported by 60 per cent and 55 per cent non-insured and insured respondents, respectively. Around 29 per cent respondents who had insured their animal reported that their buffaloes had given more than 1800 litres milk/annum. The annual milk production was higher in insured group than that in non-insured group (Fig. 4.7).

Table 18: Milk productivity and production of buffaloes

Milk production of buffalo	Non-insured	Insured	Total
No. of respondents	105	106	211
Production (lit/day/animal)			
<5	49(46.7)	34(32.1)	83(39.3)
5-6	48(45.7)	54(50.9)	102(48.3)
>6	8(7.6)	18(17)	26(12.4)
Annual production (lit/animal)			
<1400	37(35.2)	17(16)	54(25.6)
1400-1800	63(60)	58(54.7)	121(57.3)
>1800	5(4.8)	31(29.2)	36(17.1)
Total production(lit)			
<5000	49(46.7)	39(36.8)	88(41.7)
5000-10000	44(41.9)	39(36.8)	83(39.3)
10100-15000	10(9.5)	11(10.4)	21(9.9)
>15000	2(1.9)	17(16)	19(9)

Figures in parentheses indicate percentage

Further the data depicts that overall, 57 per cent respondents claimed 1400 to 1800 liter milk production/animal/annum, whereas, 17 and 26 per cent respondents reported more than 1800 liter and less than 1400 liter milk production per year per buffalo, respectively. The total milk production through dairying by non-insured animal owners was reported less than 5000 liter (47 per cent), 5000-10000 liter (42 per cent), 10100-15000 liter (9.5 per cent) and more than 15000 liter (2 per cent). Equal number of respondents (37 per cent) from insured group claimed less than 5000 and 5000-10000 liter of milk production, respectively. Ten thousand one hundred to 15000 liter of milk production annually from buffaloes was reported by 10 per cent insured respondents, whereas, 16 per cent farmers claimed more than 15000 liter of total milk production from buffaloes. More than 15000 liter of total milk production from buffaloes was reported by 16 per cent insured owners which was higher in case of non-insured respondents (12 per cent). Overall, 39 per cent and 42 per cent respondents claimed 5000- 10000 litre and less than 5000 liter total milk production,

respectively. Ten per cent and 9 per cent respondents reported 10100 to 15000 liter and more than 15000 liter milk production, respectively from dairying. Acharya and Pawer (1980) reported that average daily milk production was higher for crossbred animals than that of buffaloes and local cows.

4.1.19 Total gross milk production

Table 19 indicates that 48 per cent non-insured and 50 per cent insured respondents produced 5000 to 10000 liter of milk per year from dairy farming. More than 20000 liter of milk production per year was reported by 8 per cent insured respondents which was double of the corresponding proportion (4 per cent) than from non-insured category. Around 11 per cent of insured dairy animal owners reported milk production per year from all animals to be 15050 to 20000 liter which was also nearly double the corresponding proportion (6 per cent) from non-insured group. The average total milk production was 8150 liter per year and 10175 liter per year for non-insured and insured, respectively. Overall 49 per cent respondents produced 5000 to 10000 liter milk/year and 6 per cent reported more than 20000 liter milk production per year. The above trends clearly indicate that dairy farmers producing more milk were more favourably inclined towards insuring their livestock.

Table 19: Distribution of respondents according to total milk production per year

Total gross milk production per year (lit)	Non-insured	Insured	Total
<5000	32(26.7)	19(15.8)	51(21.3)
5000-10000	58(48.3)	60(50)	118(49.2)
10050-15000	18(15)	18(15)	36(15)
15050-20000	7(5.8)	13(10.8)	20(8.3)
>20000	5(4.1)	10(8.3)	15(6.3)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.20 Price of milk

It is evident from the data given in Table 20 that the average milk selling price for both non-insured and insured dairy animal owners was Rs 18.78 and 18.75 per liter, respectively. Overall, 72.5 per cent respondents sold their milk at Rs 18 to 20 per liter. More than Rs 20/liter milk price was received by 9 per cent respondents, whereas, 19 per cent respondents sold at the price of less than Rs18/liter.

Table 20: Distribution of respondents according to price of milk

Price of milk (Rs)	Non-insured	Insured	Total
<18	22(18.3)	23(19.2)	45(18.8)
18-20	86(71.7)	88(73.3)	174(72.5)
>20	12(10)	9(7.5)	21(8.8)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.21 Dairy farm income

The average income from dairying by non-insured and insured dairy animal owner**s** was Rs 28041 and 26950**,** respectively (table 21). Around 49 per cent of insured and 37.5 per cent of non-insured respondents got income less than Rs 20000 through dairying. More than Rs 60000 income from dairying was reported by 8 per cent non-insured and 7 per cent insured group of respondents, respectively. Around seven per cent respondents from each group reported that Rs 41000 to Rs 60000 they got through dairy farming business. Nearly half of the respondents of non-insured and one fourth insured dairy animal owners reported Rs 21000 to Rs 40000 income by dairy farming. Overall, 43 per cent and 48 per cent respondents got less than Rs 20000 to Rs 21000-40000 income, respectively from dairying. Very less number of respondents reported that they got Rs 41000 - 60000 and more than Rs 60000 income from their dairy business.

Table 21: Distribution of respondents according to dairy farm income

Dairy farm income	Non-insured	Insured	Total
<20000	45(37.5)	59(49.2)	104(43.3)
21000-40000	57(47.5)	55(25.8)	112(47.7)
41000-60000	08(6.7)	8(6.7)	16(6.7)
>60000	10(8.3)	8(6.7)	18(7.5)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.22 Gross family income

The average gross family income of non-insured and insured respondents was Rs. 95683 and Rs 95800 respectively. Mamjority of respondents from non-insured (27 per cent and 32.5 per cent) and insured (37 and 36 per cent) categories had family income of less than Rs. 40000 and between Rs. 40000-80000, respectively. Nearly equal number of dairy farmers from both the groups reported that their annual family income was more than Rs 160000. Percentage of non-insured dairy farmers who had annual gross family income of Rs 81000 to120000 and Rs 121000 to 160000 was higher than that of insured respondents. Overall, 34 per cent respondents reported annual family income of Rs 40000 to 80000 and 32 per cent respondents reported less than Rs 40000 as annual family income. The annual income of more than Rs 160000 was reported by 19 per cent dairy farmers.

Table 22: Distribution of respondents according to their family income

Dairy farm income	Non-insured	Insured	Total
<40000	32 (26.7)	44(36.7)	76(31.7)
40000-80000	39(32.5)	43(35.8)	82(34.2)
81000-120000	10(8.3)	03(2.5)	13(5.4)
121000-160000	17(14.2)	7(5.8)	24(10)
>160000	22(18.3)	23(19.2)	45(18.8)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.23 Labour employment patterns

Dairy farmers mostly used family labour for the dairy business. Mostly only one individual from each household did most of the work related to dairying. Among 73 per cent of non-insured households, only one labour looked after business of dairying while the same figure for insured households was 57 per cent. Around 42.5 per cent insured and 26 per cent non-insured respondents used 2 to 3 labour for dairying. Overall, 65 per cent respondents employed only one labour, whereas, 34 per cent respondents employed 2 to 3 labours in their dairy enterprises. The average number of labour unit was 1.53 and 1.33 for insured and non insured dairy animal owners, respectively.

Table 23: Distribution of respondents according to labour unit used at dairy farm

Labour unit	Non-insured	Insured	Total
<2	88(73.3)	68(56.7)	156(65)
2-3	31(25.8)	51(42.5)	82(34.2)
> **3**	1(0.8)	1(0.8)	2(0.8)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.1.24 Hours per day work in dairying

Majority of the respondents devoted 5 to 6 hour work per day work in their dairy farms (61 per cent). Twenty one per cent and 18 per cent of respondents spend less than 5 hours and more than 6 hours per day in his/her dairy farm. The average hours of work per day per individual for non-insured and insured dairy animal owners were 5.15 and 5.55 hours, respectively.

Table 24: Distribution of respondents according to hr/day work at their dairy farm

Hour/day	Non-insured	Insured	Total
<5	28(23.3)	23(19.2)	51(21.3)
5-6	80(66.6)	66(55)	146(60.8)
>6	12(10)	31(25.8)	43(17.9)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.2 SOURCES OF RISK, RISK ATTITUDE AND RISK MANAGEMENT STRATEGIES OF DAIRY FARMERS

4.2.1 Vulnerability of indigenous cow

The non-insured respondents reported that the average vulnerability and standard deviation of indigenous cow per year was 1.25 and 0.46, respectively, whereas, it was 1.6 (average) and 0.64 (S.D.) for insured respondents. Around twenty three per cent of non-insured and 53 per cent of insured respondents reported that their dairy animal vulnerability was two times or more than 2 times per year. Overall, 65 per cent dairy farmers reported that their indigenous cow fall ill once every year, whereas, rest of the dairy farmers claimed vulnerability of two or more than two times per year (Fig. 4.8).

Table 25: Distribution of respondents according to vulnerability of indigenous cows

Hour/day	Non-insured	Insured	Total
One time/year	59(76.6)	23(46.9)	82(65)
Two time/year	17(22.1)	22(44.9)	39(31)
Three time/year	1(1.3)	4(8.2)	5(4)
Total	77(100)	49(100)	126(100)

Figures in parentheses indicate percentage

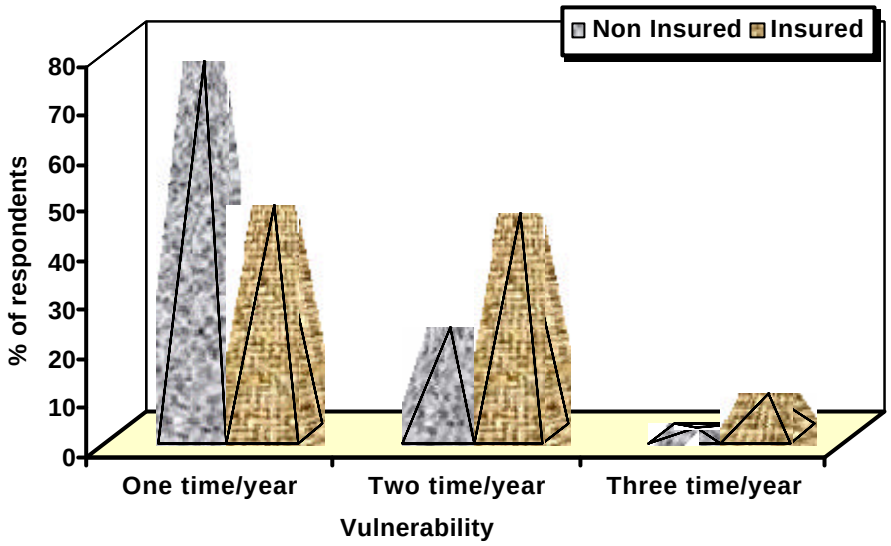


Fig. 4.8 : Vulnerability of indigenous cow

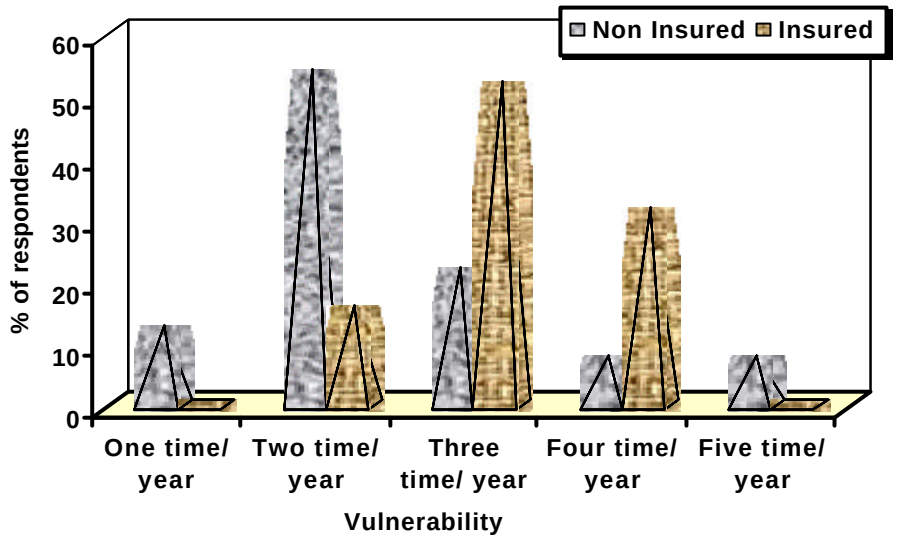


Fig. 4.9 : Vulnerability of crossbred cow

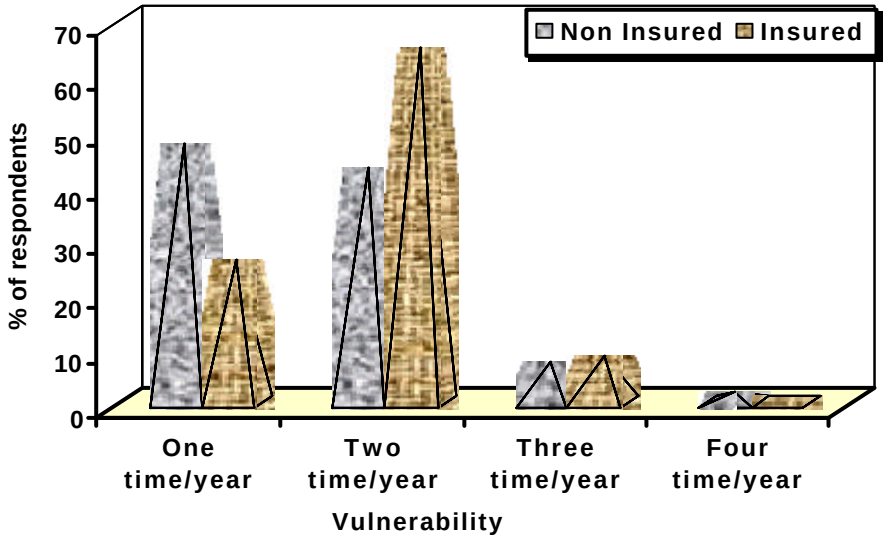


Fig. 4.10 : Vulnerability of buffalo

4.2.2 Vulnerability of crossbred cows

Around thirty eight per cent of non-insured and 84 per cent of insured respondents reported that their crossbred cows fall ill more than two times per year. The average vulnerability of crossbred animals for non-insured cows was 2.3 times/year, whereas, the same for insured crossbred cows was 3.2 times/year. Overall, more than 53 per cent crossbred cows were vulnerable 3 or more than 3 times per year to different diseases (Fig. 4.9).

Table 26: Distribution of respondents according to vulnerability of crossbred cows

Vulnerability cross-bred	Non-insured	Insured	Total
One time/year	8(12.7)	0(00)	8(7.5)
Two time/year	34(54)	7(15.9)	41(38.3)
Three time/year	14(22.2)	23(52.3)	37(34.60
Four time/year	5(7.9)	14(31.8)	19(17.8)
Five time/year	1(7.9)	0(00)	1(0.9)
Total	63(100)	44(100)	107(100)

Figures in parentheses indicate percentage

4.2.3 Vulnerability of buffaloes

The average vulnerability of buffalo for non-insured and insured group was 1.64 and 1.82 times/year, whereas, standard deviation was 0.70 and 0.52, respectively. Overall, more than 60 per cent respondents claimed that their buffaloes fall ill 2 or more than two times per year (Fig. 4.10).

Table 27: Distribution of respondents according to vulnerability of buffaloes

Vulnerability buffalo	Non-insured	Insured	Total
One time/year	50(47.6)	28(26.4)	78(37)
Two time/year	45(42.9)	69(65.1)	114(54)
Three time/year	8(7.6)	9(8.5)	17(8.1)
Four time/year	2(1.9)	0(00)	2(0.9)
Total	105(100)	106(100)	211(100)

Figures in parentheses indicate percentage

4.2.4 Vulnerability of male animals

Male animals were not much vulnerable to different diseases. The average vulnerability of male animals of non-insured and insured group of dairy farmers was 1.44 and 1.41 times/year, respectively.

Table 28: Distribution of respondents according to vulnerability of male cattle

Vulnerability male	Non-insured	Insured	Total
One time/year	29(58)	44(59.5)	73(58.9)
Two time/year	20(40)	30(40.5)	50(40.3)
Three time/year	1(2)	0(00)	1(0.8)
Total	50(100)	74(100)	124(100)

Figures in parentheses indicate percentage

From the above tables, it is clearly evident that crossbred cows were more vulnerable to different diseases than indigenous cows and buffaloes and the dairy farmers are more inclined to insure the crossbred cows.

4.2.5 Cost of treatment of animal

The insured and non-insured respondents reported that the average treatment cost per dairy animal per year was Rs 1394 and Rs 940, respectively. More than 36 per cent of respondents belonging to insured category reported that they paid more than Rs 1600 per year towards treatment cost for their dairy cattle and buffaloes, whereas, only 2 per cent respondents of non-insured dairy animal spent this amount on treatment. Around fifty three per cent and 45 per cent of non-insured respondents paid less than Rs 1000 and between Rs 1000 to 1500, respectively. The above amounts were given by 26 per cent and 37.5 per cent of insured dairy animal respondents every year as a treatment cost for each dairy animal, respectively. Overall, about 80 per cent respondents spend less than Rs 1500 as treatment cost for dairy animal, whereas, about 20 per cent dairy farmers spend more than Rs 1500.

Table 29: Distribution of respondents according to money spent on treatment of animals

Treatment cost	Non-insured	Insured	Total
<1000	64(53.3)	31(25.8)	95(39.6)
1000-1500	54(45)	45(37.5)	99(41.3)
1600-2000	02(1.7)	31(25.8)	33(13.8)
>2000	0(00)	13(10.8)	13(5.4)
Total	120(100)	120(100)	240(100)

Figures in parentheses indicate percentage

4.2.6 Sources of risk perception

Tables 30, 31 and 32 present the distribution of respondents according to their perception of different sources of risk. The second last and last column of table shows the average scores of dairy farmers' perception of each source of risk and the standard deviation of sources, respectively. Standard deviations of value more than one for each of the source of risk indicates that disparity exists among the dairy farmers' risk perception.

4.2.6.1 Risk perception of non- insured dairy animal farmers

Table 30 shows that the sources of risk perceived by large proportion of non -insured dairy animal owners to be either somewhat relevant or relevant were epidemic livestock diseases (85 per cent), variability in milk price (70 per cent), family health concerns (83 per cent), climate risk (81 per cent), marketing / sale risk (85 per cent), feed cost variability (80 per cent), crop yield variability (70 per cent), changes in production technology (70 per cent), poor conception (80 per cent), silent heat (65 per cent), anestrous (63 per cent), delay in treatment / AI (74 per cent) and unavailability of veterinary doctor (64 per cent). The table shows that the average scores for the above sources of risk were 4.42, 4.01, 4.38, 4.21, 4.43, 4.23, 3.95, 3.88, 4.34, 3.78, 3.88, 4.01 and 3.92. The sources of risk like variability in milk price, changes in production technology, silent heat, anestrous, delay in treatment / AI, and unavailability of veterinary doctor had less than one standard deviation, indicating a high level of consensus among respondents.

Sources of risk such as epidemic livestock diseases, family health concerns, climate risk, marketing / sale risk, feed cost variability, crop yield variability and poor conception had more than one standard deviation which indicates that disparity exists to some extent among the respondents regarding how they perceive these source of risk.

Epidemic livestock diseases, marketing / sale risk, poor conception shows high average scores. High score attributed to epidemic livestock diseases may be due to frequent occurrence of epidemic livestock diseases every year in the study area. Marketing system for milk was not developed in the study area as per the requirement of the dairy farmers. Dairy farmers sold their milk to nearby towns. The price of milk sometimes falls due to glut in production resulting in demand supply mismatch. Milk marketing was done mostly through middlemen who did not assure remunerative price to the dairy farmers for their milk. The AI facility was not adequate; the dairy farmers have to take their animals to the veterinary hospital for AI which is often located at far distance from their village thus, resulting in poor conception in dairy animals. The AI facility should be available at the farmers' doorstep to ensure good results in future in regard to conception of dairy animals.

Sources of risk that received average score below 3 (indicating that they were generally not perceived as relevant) were related to environment policy and elimination of government support.

Table 30: Non-insured dairy farmers' perception of different sources of risks

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Livestock diseases (epidemic)	6 (5.00)	3 (2.50)	9 (7.50)	19 (15.83)	83 (69.17)	4.42	1.46
2. Variability in milk price	9 (7.50)	5 (4.17)	21 (17.50)	26 (21.67)	59 (49.17)	4.01	0.98
3. Variability in milk yield	11 (9.17)	15 (12.50)	29 (24.17)	20 (16.67)	45 (37.50)	3.61	0.70
4. Family health concerns	8 (6.67)	5 (4.17)	6 (5.00)	16 (13.33)	85 (70.83)	4.38	1.50
5. Climate risk	5 (4.17)	9 (7.50)	8 (6.67)	32 (26.67)	66 (55.00)	4.21	1.14
6. Marketing / sale	4 (3.33)	3 (2.50)	10 (8.33)	24 (20.00)	79 (65.83)	4.43	1.38

Table 30: Contd...

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
7. Price variability of livestock products	16 (13.33)	7 (5.83)	23 (19.17)	34 (28.33)	40 (33.33)	3.63	0.67
8. Cost of operating inputs	18 (15.00)	12 (10.00)	24 (20.00)	30 (25.00)	36 (30.00)	3.45	0.57
9. Feed cost variability	6 (5.00)	4 (3.33)	14 (11.67)	28 (23.33)	68 (56.67)	4.23	1.17
10. Forage yield uncertainty	18 (15.00)	8 (6.67)	22 (18.33)	35 (29.17)	37 (30.83)	3.54	0.63
11. Crop yield variability	13 (10.83)	6 (5.00)	16 (13.33)	24 (20.00)	61 (50.83)	3.95	1.02
12. Changes in production technology	7 (5.83)	5 (4.17)	25 (20.83)	41 (34.17)	42 (35.00)	3.88	0.76
13. Poor conception	4 (3.33)	3 (2.50)	17 (14.17)	20 (16.67)	76 (63.33)	4.34	1.31
14. Silent heat	12 (10.00)	3 (2.50)	26 (21.67)	38 (31.67)	41 (34.17)	3.78	0.73
15. Anoestrus	8 (6.67)	5 (4.17)	30 (25.00)	27 (22.50)	50 (41.67)	3.88	0.82
16. Delay in treatment / AI	9 (7.50)	6 (5.00)	16 (13.33)	33 (27.50)	56 (46.67)	4.01	0.95
17. Unavailability of veterinary doctor	6 (5.00)	3 (2.50)	34 (28.33)	29 (24.17)	48 (40.00)	3.92	0.81
18. Lack of extension agency support	15 (12.50)	7 (5.83)	32 (26.67)	26 (21.67)	40 (33.33)	3.58	0.64
19. Animal diseases (non-epidemic)	19 (15.83)	11 (9.17)	27 (22.50)	20 (16.67)	43 (35.83)	3.48	0.66
20. Consumer preferences	16 (13.33)	6 (5.00)	39 (32.50)	17 (14.17)	42 (35.00)	3.53	0.68
21. Changes of interests rate and ability to repay loans	21 (17.50)	6 (5.00)	21 (17.50)	29 (24.17)	34 (28.33)	3.18	0.55
22. Changes of agricultural policy	28 (23.33)	13 (10.83)	35 (29.17)	9 (7.50)	35 (29.17)	3.08	0.54
23. Property rights (enough own land and inheritance rights)	14 (11.67)	5 (4.17)	39 (32.50)	13 (10.83)	49 (40.83)	3.65	0.82
24. Lack of labor force (in or out family)	20 (16.67)	8 (6.67)	25 (20.83)	16 (13.33)	51 (42.50)	3.58	0.82
25. Environment policy	33 (27.50)	10 (8.33)	39 (32.50)	12 (10.00)	26 (21.67)	2.90	0.42
26. Burglary/ theft etc	26 (21.67)	9 (7.50)	29 (24.17)	18 (15.00)	38 (31.67)	3.28	0.57
27. Injury, illness/ death of farm operator	13 (10.83)	4 (3.33)	40 (33.33)	15 (12.50)	48 (40.00)	3.68	0.80
28. Animal welfare policy	30 (25.00)	6 (5.00)	37 (30.83)	15 (12.50)	32 (26.67)	3.11	0.51
29. Elimination of government support	26 (21.67)	14 (11.67)	39 (32.50)	19 (15.83)	22 (18.33)	2.98	0.36
30. Changes in farm capital	16 (13.33)	9 (7.50)	44 (36.67)	8 (6.67)	43 (35.83)	3.44	0.74

Figures in parentheses indicate percentage

The sources of risk perceived as somewhat relevant or relevant by lower combined proportion of non-insured respondents were variability in milk yield (54 per cent), price variability of livestock products (51 per cent), cost of operating inputs (55 per cent), forage yield uncertainty (60 per cent), lack of extension agency support (55 per cent), non-epidemic animal diseases (52 per cent), consumer preferences (49 per cent), changes of interests rate and ability to repay loans (52 per cent), changes of agricultural policy (36 per cent), property rights (enough own land and inheritance rights) (51 per cent), lack of labor force (in or out family) (55 per cent), burglary/ theft (46 per cent), injury, illness/death of farm operator (52 per cent), animal welfare policy (39 per cent) and changes in farm capital (42 per cent).

4.2.6.2 Risk perception of insured dairy animal farmers

Table 31 shows that sources of risk perceived as somewhat relevant or relevant by large proportion of insured dairy animal farmers' were epidemic livestock diseases (89 per cent), variability in milk price (69 per cent), family health concerns (77 per cent), climate risk (77 per cent), marketing / sale (80 per cent), price variability of livestock products (65 per cent), Cost of operating inputs (67 per cent), Feed cost variability (85 per cent), Forage yield uncertainty (65 per cent), Crop yield variability (70 per cent), Changes in production technology (67 per cent), Poor conception (80 per cent), Delay in treatment / AI (83 per cent) Changes of interests rate and ability to repay loans (70 per cent), Lack of labor force (in or out family) (65 per cent) and Injury, illness/death of farm operator (67 per cent). The average scores for the above sources of risk also were also i.e. 4.56, 3.82, 4.16, 4.25, 4.10, 3.88, 3.73, 4.22, 3.51, 4.01, 3.90, 4.23, 4.17, 4.04, 3.71 and 3.87, respectively.

The standard deviation was more than one for epidemic livestock diseases, family health concerns, climate risk, marketing / sale, feed cost variability, poor conception, delay in treatment / AI, changes of interest rate and ability to repay loans indicating disparity in perception to some extent exists among the insured dairy animal owners. Other sources of risk had less than one standard deviation which indicates that there was some consensus among the insured dairy animal farmers.

Table 31: Insured dairy farmers' perception of different sources of risks

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Livestock diseases (epidemic)	5 (4.17)	2 (1.67)	6 (5.00)	15 (12.50)	92 (76.67)	4.56	1.64
2. Variability in milk price	14 (11.67)	8 (6.67)	15 (12.50)	32 (26.67)	51 (42.50)	3.82	0.85
3. Variability in milk yield	16 (13.33)	10 (8.33)	19 (15.83)	27 (22.50)	48 (40.00)	3.68	0.77
4. Family health concerns	9 (7.50)	7 (5.83)	11 (9.17)	22 (18.33)	71 (59.17)	4.16	1.22
5. Climate risk	10 (8.33)	3 (2.50)	14 (11.67)	13 (10.83)	80 (66.67)	4.25	1.40
6. Marketing / sale	13 (10.83)	4 (3.33)	7 (5.83)	30 (25.00)	66 (55.00)	4.10	1.15
7. Price variability of livestock products	9 (7.50)	7 (5.83)	26 (21.67)	25 (20.83)	53 (44.17)	3.88	0.87
8. Cost of operating inputs	14 (11.67)	10 (8.33)	15 (12.50)	37 (30.83)	44 (36.67)	3.73	0.76
9. Feed cost variability	9 (7.50)	2 (1.67)	6 (5.00)	40 (33.33)	63 (52.50)	4.22	1.13
10. Forage yield uncertainty	20 (16.67)	6 (5.00)	16 (13.33)	49 (40.83)	29 (24.17)	3.51	0.68
11. Crop yield variability	8 (6.67)	4 (3.33)	23 (19.17)	29 (24.17)	56 (46.67)	4.01	0.94
12. Changes in production technology	13 (10.83)	7 (5.83)	19 (15.83)	21 (17.50)	60 (50.00)	3.90	0.99
13. Poor conception	7 (5.83)	3 (2.50)	12 (10.00)	31 (25.83)	67 (55.83)	4.23	1.16
14. Silent heat	16 (13.33)	7 (5.83)	20 (16.67)	25 (20.83)	52 (43.33)	3.75	0.85
15. Anoestrus	11 (9.17)	8 (6.67)	23 (19.17)	33 (27.50)	45 (37.50)	3.78	0.75
16. Delay in treatment / AI	9 (7.50)	4 (3.33)	7 (5.83)	38 (31.67)	62 (51.67)	4.17	1.10
17. Unavailability of veterinary doctor	15 (12.50)	3 (2.50)	38 (31.67)	30 (25.00)	34 (28.33)	3.54	0.60
18. Lack of extension agency support	13 (10.83)	8 (6.67)	34 (28.33)	36 (30.00)	29 (24.17)	3.50	0.55
19. Animal diseases (non-epidemic)	17 (14.17)	10 (8.33)	18 (15.00)	17 (14.17)	58 (48.33)	3.74	0.95
20. Consumer preferences	24 (20.00)	15 (12.50)	28 (23.33)	22 (18.33)	31 (25.83)	3.18	0.44
21. Changes of interests rate and ability to repay loans	14 (11.67)	5 (4.17)	16 (13.33)	12 (10.00)	73 (60.83)	4.04	1.26
22. Changes of agricultural policy	19 (15.83)	13 (10.83)	42 (35.00)	18 (15.00)	28 (23.33)	3.19	0.46

Table 31: Contd...

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
23. Property rights (enough own land and inheritance rights)	11 (9.17)	7 (5.83)	32 (26.67)	16 (13.33)	54 (45.00)	3.79	0.89
24. Lack of labor force (in or out family)	15 (12.50)	10 (8.33)	17 (14.17)	31 (25.83)	47 (39.17)	3.71	0.77
25. Environment policy	20 (16.67)	13 (10.83)	35 (29.17)	19 (15.83)	33 (27.50)	3.27	0.50
26. Burglary/ theft etc	22 (18.33)	16 (13.33)	32 (26.67)	24 (20.00)	26 (21.67)	3.13	0.39
27. Injury, illness/ death of farm operator	14 (11.67)	7 (5.83)	19 (15.83)	21 (17.50)	59 (49.17)	3.87	0.97
28. Animal welfare policy	21 (17.50)	14 (11.67)	36 (30.00)	23 (19.17)	26 (21.67)	3.16	0.41
29. Elimination of government support	30 (25.00)	9 (7.50)	31 (25.83)	16 (13.33)	34 (28.33)	3.13	0.51
30. Changes in farm capital	23 (19.17)	12 (10.00)	24 (20.00)	28 (23.33)	33 (27.50)	3.30	0.51

Figures in parentheses indicate percentage

Table 31 clearly shows that the average scores of none of the sources of risk were less than 3, which indicate that all the sources of risk were generally relevant for the insured dairy animal farmers. The average scores were less than 3.5 for risk sources like risk of consumer preferences, changes of agricultural policy, environment policy, burglary/ theft etc, animal welfare policy, elimination of government support and changes in farm capital indicating that these sources of risk were somewhat less relevant compared to other sources or risk for insured dairy animal farmers. Risks such as epidemic livestock diseases, family health concerns, climate risk, marketing / sale, feed cost variability, crop yield variability, poor conception, delay in treatment / AI and changes of interests rate and ability to repay loan had high value of average score indicating that these were perceived as more relevant sources of risk.

4.2.6.3 Risk perception of all dairy farmers (pooled)

Table 32 shows that the risk perception**s** of all the dairy farmers (insured and non insured). Epidemic livestock diseases, family health concerns, climate risk,

marketing / sales risk, feed cost variability, poor conception and delay in treatment / AI had higher average score**s** indicating these sources of risk were relevant to the dairy farmers. Consumer preferences, changes of agricultural policy, environment policy, burglary/ theft, animal welfare policy, elimination of government support and changes in farm capital risks received have less average scores indicating that these sources of risk were less relevant than the other sources of risk. Sources of risk like Variability in milk price, Crop yield variability, changes in production technology and anoestrus had high average value and less than one standard deviation indicating that these sources of risk were relevant with high level of consensus among the dairy farmers.

Table 32: Combined (insured and non-insured) dairy farmers' perception of different sources of risks

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Livestock diseases (epidemic)	11 (4.58)	5 (2.08)	15 (6.25)	34 (14.17)	175 (72.92)	4.49	1.55
2. Variability in milk price	23 (9.58)	13 (5.42)	36 (15.00)	58 (24.17)	110 (45.83)	3.91	0.91
3. Variability in milk yield	27 (11.25)	25 (10.42)	48 (20.00)	47 (19.58)	93 (38.75)	3.64	0.73
4. Family health concerns	17 (7.08)	12 (5.00)	17 (7.08)	38 (15.83)	156 (65.00)	4.27	1.36
5. Climate risk	15 (6.25)	12 (5.00)	22 (9.17)	45 (18.75)	146 (60.83)	4.23	1.26
6. Marketing / sale	17 (7.08)	7 (2.92)	17 (7.08)	54 (22.50)	145 (60.42)	4.26	1.26
7. Price variability of livestock products	25 (10.42)	14 (5.83)	49 (20.42)	59 (24.58)	93 (38.75)	3.75	0.76
8. Cost of operating inputs	32 (13.33)	22 (9.17)	39 (16.25)	67 (27.92)	80 (33.33)	3.59	0.66
9. Feed cost variability	15 (6.25)	6 (2.50)	20 (8.33)	68 (28.33)	131 (54.58)	4.23	1.14
10. Forage yield uncertainty	38 (15.83)	14 (5.83)	38 (15.83)	84 (35.00)	66 (27.50)	3.53	0.64
11. Crop yield variability	21 (8.75)	10 (4.17)	39 (16.25)	53 (22.08)	117 (48.75)	3.98	0.98
12. Changes in production technology	20 (8.33)	12 (5.00)	44 (18.33)	62 (25.83)	102 (42.50)	3.89	0.85
13. Poor conception	11 (4.58)	6 (2.50)	29 (12.08)	51 (21.25)	143 (59.58)	4.29	1.23

Table 32: Contd...

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
14. Silent heat	28 (11.67)	10 (4.17)	46 (19.17)	63 (26.25)	93 (38.75)	3.76	0.77
15. Anoestrus	19 (7.92)	13 (5.42)	53 (22.08)	60 (25.00)	95 (39.58)	3.83	0.78
16. Delay in treatment / AI	18 (7.50)	10 (4.17)	23 (9.58)	71 (29.58)	118 (49.17)	4.09	1.02
17. Unavailability of veterinary doctor	21 (8.75)	6 (2.50)	72 (30.00)	59 (24.58)	82 (34.17)	3.73	0.69
18. Lack of extension agency support	28 (11.67)	15 (6.25)	66 (27.50)	62 (25.83)	69 (28.75)	3.54	0.58
19. Animal diseases (non-epidemic)	36 (15.00)	21 (8.75)	45 (18.75)	37 (15.42)	101 (42.08)	3.61	0.80
20. Consumer preferences	40 (16.67)	21 (8.75)	67 (27.92)	39 (16.25)	73 (30.42)	3.35	0.56
21. Changes of interests rate and ability to repay loans	35 (14.58)	11 (4.58)	37 (15.42)	41 (17.08)	107 (44.58)	3.61	0.88
22. Changes of agricultural policy	47 (19.58)	26 (10.83)	77 (32.08)	27 (11.25)	63 (26.25)	3.14	0.49
23. Property rights (enough own land and inheritance rights)	25 (10.42)	12 (5.00)	71 (29.58)	29 (12.08)	103 (42.92)	3.72	0.85
24. Lack of labor force (in or out family)	35 (14.58)	18 (7.50)	42 (17.50)	47 (19.58)	98 (40.83)	3.65	0.78
25. Environment policy	53 (22.08)	23 (9.58)	74 (30.83)	31 (12.92)	59 (24.58)	3.08	0.45
26. Burglary/ theft etc	48 (20.00)	25 (10.42)	61 (25.42)	42 (17.50)	64 (26.67)	3.20	0.47
27. Injury, illness/ death of farm operator	27 (11.25)	11 (4.58)	59 (24.58)	36 (15.00)	107 (44.58)	3.77	0.87
28. Animal welfare policy	51 (21.25)	20 (8.33)	73 (30.42)	38 (15.83)	58 (24.17)	3.13	0.45
29. Elimination of government support	56 (23.33)	23 (9.58)	70 (29.17)	35 (14.58)	56 (23.33)	3.05	0.42
30. Changes in farm capital	39 (16.25)	21 (8.75)	68 (28.33)	36 (15.00)	76 (31.6)	3.37	0.59

Figures in parentheses indicate percentage

The risk environment of farmers is changing, in part due to increasing market liberalization and industrialization of agriculture (Boehlje and Lins, 1998). Many researchers found that these changes lead to new risks, and new risk management instruments are being developed (Blank, 1995; Harwood *et al*., 1996; Goodwin and

Ker, 1998; Skees *et al*., 1998). In a study by Meuwissen *et al*., 2001 found that the highest scores were given to risks of risk related to meat price, epidemic animal disease and milk price. In investigating farm/farmer characteristics that relate to farmers' perceptions of risk and risk management, Patrick *et al*. (1985) noted that the perceptions varied across geographic areas and by farm type. Boggess *et al*. (1985) and Wilson *et al*. (1988) found that perceptions varied so much among individuals that a risk classification based on socioeconomic variables was not possible. Wilson *et al*. (1993) reported that "results illustrate the highly complex and individualistic nature of risk perceptions and the selection of management tools". Patrick and Musser (1997) concluded that, besides geographic location and farm type, institutional structures and other factors affecting the operating environment of producers were also likely to influence farmers' perceptions of risk and risk management.

4.2.7 Risk attitude of dairy farmers

To get the insight into a dairy farmers' risk attitude, 35 statements were used as shown in tables 33, 34 and 35. The Likert type scale was used as it is suitable to measure the risk attitude of an individual. The response given by dairy farmers was measured on a 5 point continumm. A strong agreement (score 5) implied that the dairy farmer was not willing to adopt the risk management tool for that statement. On the other hand, strong disagreement (score 1) indicated a risk aversion attitude of dairy farmer. Some statements were positive and while some where negative to avoid response bias.

The following example will clear how a farmers' response to particular risk management tool reflects his/her attitude towards risk. Consider statement 3, i.e. 'I never vaccinate my animals'. Strong agreement (score 5) to this statement reflects that the dairy farmer is not interested in this risk management tool. This shows dairy farmers' risk taking attitude. On the other hand strong disagreement to this statement (score 1) implies that farmer would adopt this particular risk management tool. This shows dairy farmer's risk aversion attitude. Some statements were positively worded like statement 1,5,8,10,11,15,18,21 and 33 but here also strong disagreement

would correspond to a risk aversion attitude of dairy farmer (Bardhan and Tewari, 2007). For example, disagreement with statement 21, i.e. 'I allow my animals for grazing' would imply that farmer had taken adequate measures to prevent occurrence of different diseases due to grazing by means of vaccination of their animal against diseases.

Some statements were negatively worded and the scoring of options were done in such a way that the option of strong disagreement got score 1 while that of strong agreement got score 5. Thus, the lower score reflects that the farmer is willing to adopt the risk management tool that the statement reflects due to his/her high risk averse attitude.

4.2.7.1 Risk attitude of non insured dairy animal owners

Table 33: Distribution of non-insured dairy animal farmers risk attitude

Statement	SDA	DA	UD	A	SA	Ave. score	SD
1. I try new method in dairy farming	19 (15.83)	10 (8.33)	34 (28.33)	26 (21.67)	31 (25.83)	3.33	0.49
2. I do not involve in other business expect dairying	29 (24.17)	35 (29.17)	25 (20.83)	17 (14.17)	14 (11.67)	2.60	0.16
3. I never vaccinate my animals	41 (34.17)	32 (26.67)	19 (15.83)	12 (10.00)	16 (13.33)	2.42	0.13
4. I never consult for any one for dairying	16 (13.33)	44 (36.67)	36 (30.00)	9 (7.50)	15 (12.50)	2.69	0.32
5. My animals are low producers	32 26.67)	21 (17.50)	40 (33.33)	17 (14.17)	10 (8.33)	2.60	0.29
6. My animals are not resistant to diseases	12 (10.00)	7 (5.83)	31 (25.83)	27 (22.50)	43 (35.83)	3.68	0.69
7. I never have enough cash for bad situation	28 (23.33)	23 (19.17)	37 (30.83)	10 (8.33)	22 (18.33)	2.79	0.34
8. Only I am interested in dairying from my family	38 (31.67)	21 (17.50)	30 (25.00)	13 (10.83)	18 (15.00)	2.60	0.21
9. I never do any future contract for my dairying	15 (12.50)	8 (6.67)	49 (40.83)	21 (17.50)	27 (22.50)	3.31	0.52
10. I use modern equipments for dairying	41 (34.17)	18 (15.00)	40 (33.33)	5 (4.17)	16 (13.33)	2.48	0.34

Table 33: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
11. I take bank loan for expansion of dairying	47 (39.17)	13 (10.83)	43 (35.83)	6 (5.00)	11 (9.17)	2.34	0.36
12. I do not start dairying with bank loan	16 (13.33)	4 (3.33)	37 (30.83)	21 (17.50)	42 (35.00)	3.58	0.68
13. I do not produces milk with low cost	36 (30.00)	20 (16.67)	21 (17.50)	19 (15.83)	24 (20.00)	2.79	0.28
14. I do not have any life insurance policy	20 (16.67)	9 (7.50)	31 (25.83)	26 (21.67)	34 (28.33)	3.38	0.53
15. I have enough land for fodder production	32 (26.67)	15 (12.50)	45 (37.50)	10 (8.33)	18 (15.00)	2.73	0.38
16. I never received any training for dairy enterprise	12 (10.00)	5 (4.17)	27 (22.50)	22 (18.33)	54 (45.00)	3.84	0.88
17. I never treat my animals with veterinarians	47 (39.17)	17 (14.17)	33 (27.50)	9 (7.50)	14 (11.67)	2.38	0.23
18. I am always ready to invest in crossbred	31 (25.83)	18 (15.00)	37 (30.83)	15 (12.50)	19 (15.83)	2.78	0.30
19. I never invest for expansion of dairy business	29 (24.17)	13 (10.83)	42 (35.00)	8 (6.67)	28 (23.33)	2.94	0.48
20. Other sources of income is not necessary for survival of my family	33 (27.50)	16 (13.33)	15 (12.50)	21 (17.50)	35 (29.17)	3.08	0.50
21. I allow my animals for grazing	20 (16.67)	16 (13.33)	25 (20.83)	12 (10.00)	47 (39.17)	3.42	0.73
22. I never practice hygienic measures for good quality of milk production	52 (43.33)	24 (20.00)	28 (23.33)	9 (7.50)	7 (5.83)	2.13	0.17
23. My animals never get good bedding	41 (34.17)	20 (16.67)	35 (29.17)	10 (8.33)	14 (11.67)	2.47	0.24
24. I never store feed and fodder for lean season	33 (27.50)	18 (15.00)	38 (31.67)	9 (7.50)	22 (18.33)	2.74	0.35
25. I never give adequate concentrate and green fodder to pregnant and lactating animals	61 (50.83)	11 (9.17)	21 (17.50)	12 (10.00)	15 (12.50)	2.24	0.17
26. I never supervise dairy production with documentation	13 (10.83)	8 (6.67)	45 (37.50)	19 (15.83)	35 (29.17)	3.46	0.60

Table 33: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
27. I never use or sell manure as fertilizer	56 (46.67)	17 (14.17)	29 (24.17)	4 (3.33)	14 (11.67)	2.19	0.24
28. I never use readymade concentrate mixture for animals	30 (25.00)	10 (8.33)	41 (34.17)	14 (11.67)	25 (20.83)	2.95	0.42
29. I never make hay and silage for animals	14 (11.67)	6 (5.00)	34 (28.33)	18 (15.00)	48 (40.00)	3.67	0.78
30. I never use high quality of semen for AI	61 (50.83)	12 (10.00)	39 (32.50)	2 (1.67)	6 (5.00)	2.00	0.36
31. I never take advise from Govt./ NGO/ extension agency etc	21 (17.50)	9 (7.50)	42 (35.00)	11 (9.17)	37 (30.83)	3.28	0.61
32. I never sold milk lower to production cost	24 (20.00)	6 (5.00)	29 (24.17)	20 (16.67)	41 (34.17)	3.40	0.64
33. I demand high prize at scarcity period.	32 (26.67)	16 (13.33)	40 (33.33)	8 (6.67)	24 (20.00)	2.80	0.40
34. I never use new technology for fodder production and fodder treatment.	19 (15.83)	5 (4.17)	55 (45.83)	10 (8.33)	31 (25.83)	3.24	0.63
35. I never listen/see any dairy related programme on mass media	26 (21.7)	12 (10.00)	37 (30.83)	7 (5.83)	38 (31.67)	3.16	0.61

Figures in parentheses indicate percentage
SDA= Strong disagreement, DA= Disagreement, UD= Undecided, A= Agreement and SA= Strong agreement

The average scores for statements 1, 9, 12, 14, 16, 19 and 26 were above the neutral score. The non-insured dairy animal owners were disinclined towards future contract for dairying, bank loan for dairy, any life insurance policy, training for dairy enterprise, investment for expansion of dairy business and supervision of dairy business with documentation. Statement 1 was positively worded. Thus agreement with this statement implied that the dairy farmers were inclined to try new method of dairy farming. The high scores of the above statements suggest that the dairy farmers were not risk averse in respect to the above 8 aspects of dairy farming.

Statements with attitudinal scores lower than the neutral score 3 were statements 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 15, 17, 18, 21, 22, 23, 24, 25, 27, 30, 32, 33, 34 and 35. Thus farmers were inclined towards other business except dairy, vaccinating animals, consulting for dairying, high producing milk animals, resistant to different diseases, have enough cash for bad situation, involvement of other persons in dairying, use of modern equipment, loan for expansion of dairying, producing low cost milk, have enough land for fodder production, treatment of animals by veterinarian, ready to investment in crossbred , grazing of animals , practice of hygienic measures for good quality of milk production, give good bedding materials to the animals, store feed and fodder during lean period, extra green and concentrate for pregnant and lactating animals, sale of manure, use of high quality semen for AI, sale of milk at higher cost than cost of production, more price of milk during scarcity period, use of new technique for fodder production and treatment and mass media exposure on dairy related programmes as the risk management tools.

The dairy farmers' were undecided about risk management tools like other sources of income is necessary for the survival of their family, use of readymade mixture importance in nutrition, importance of hay and silage, importance of advise from government, NGO and extension agency.

4.2.7.2 Risk attitude of insured dairy animal owners

Table 34: Distribution of insured dairy animal farmers' risk attitude

Statement	SDA	DA	UD	A	SA	Ave. score	SD
1. I try new method in dairy farming	15 (12.50)	18 (15.00)	41 (34.17)	20 (16.67)	26 (21.67)	3.20	0.43
2. I do not involve in other business expect dairying	27 (22.50)	24 (20.00)	34 (28.33)	13 (10.83)	22 (18.33)	2.83	0.30
3. I never vaccinate my animals	56 (46.67)	16 (13.33)	25 (20.83)	7 (5.83)	16 (13.33)	2.26	0.20
4. I never consult for any one for dairying	31 (25.83)	39 (32.50)	29 (24.17)	4 (3.33)	17 (14.17)	2.48	0.28
5. My animals are low producers	25 (20.83)	15 (12.50)	45 (37.50)	26 (21.67)	9 (7.50)	2.83	0.41
6. My animals are not resistant to diseases	8 (6.67)	5 (4.17)	21 (17.50)	34 (28.33)	52 (43.33)	3.98	0.88

Table 34: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
7. I never have enough cash for bad situation	31 (25.83)	13 (10.83)	33 (27.50)	28 (23.33)	15 (12.50)	2.86	0.32
8. Only I am interested in dairying from my family	35 (29.17)	17 (14.17)	36 (30.00)	10 (8.33)	22 (18.33)	2.73	0.33
9. I never do any future contract for my dairying	18 (15.00)	11 (9.17)	50 (41.67)	18 (15.00)	23 (19.17)	3.14	0.48
10. I use modern equipments for dairying	29 (24.17)	21 (17.50)	56 (46.67)	4 (3.33)	10 (8.33)	2.54	0.51
11. I take bank loan for expansion of dairying	25 (20.83)	12 (10.00)	35 (29.17)	16 (13.33)	32 (26.67)	3.15	0.48
12. I do not start dairying with bank loan	49 (40.83)	19 (15.83)	15 (12.50)	5 (4.17)	32 (26.67)	2.60	0.46
13. I do not produces milk with low cost	43 (35.83)	26 (21.67)	27 (22.50)	8 (6.67)	16 (13.33)	2.40	0.18
14. I do not have any life insurance policy	26 (21.67)	15 (12.50)	39 (32.50)	18 (15.00)	22 (18.33)	2.96	0.36
15. I have enough land for fodder production	40 (33.33)	17 (14.17)	31 (25.83)	13 (10.83)	19 (15.83)	2.62	0.24
16. I never received any training for dairy enterprise	10 (8.33)	6 (5.00)	16 (13.33)	20 (16.67)	68 (56.67)	4.08	1.15
17. I never treat my animals with veterinarians	57 (47.50)	23 (19.17)	20 (16.67)	7 (5.83)	13 (10.83)	2.13	0.12
18. I am always ready to invest in crossbred	43 (35.83)	14 (11.67)	33 (27.50)	11 (9.17)	19 (15.83)	2.58	0.27
19. I never invest for expansion of dairy business	30 (25.00)	10 (8.33)	29 (24.17)	16 (13.33)	35 (29.17)	3.13	0.52
20. Other sources of income is not necessary for survival of my family	18 (15.00)	8 (6.67)	34 (28.33)	32 (26.67)	28 (23.33)	3.37	0.50
21. I allow my animals for grazing	29 (24.17)	15 (12.50)	28 (23.33)	17 (14.17)	31 (25.83)	3.05	0.43
22. I never practice hygienic measures for good quality of milk production	64 (53.33)	21 (17.50)	20 (16.67)	4 (3.33)	11 (9.17)	1.98	0.16

Table 34: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
23. My animals never get good bedding	56 (46.67)	26 (21.67)	27 (22.50)	3 (2.50)	8 (6.67)	2.01	0.21
24. I never store feed and fodder for lean season	26 (21.67)	23 (19.17)	47 (39.17)	9 (7.50)	15 (12.50)	2.70	0.39
25. I never give adequate concentrate and green fodder to pregnant and lactating animals	66 (55.00)	14 (11.67)	13 (10.83)	10 (8.33)	17 (14.17)	2.15	0.19
26. I never supervise dairy production with documentation	15 (12.50)	5 (4.17)	45 (37.50)	7 (5.83)	48 (40.00)	3.57	0.84
27. I never use or sell manure as fertilizer	42 (35.00)	12 (10.00)	40 (33.33)	8 (6.67)	18 (15.00)	2.57	0.35
28. I never use ready-made concentrate mixture for animals	41 (34.17)	14 (11.67)	36 (30.00)	13 (10.83)	16 (13.33)	2.58	0.27
29. I never make hay and silage for animals	19 (15.83)	9 (7.50)	29 (24.17)	21 (17.50)	42 (35.00)	3.48	0.65
30. I never use high quality of semen for AI	73 (60.83)	10 (8.33)	22 (18.33)	4 (3.33)	11 (9.17)	1.92	0.22
31. I never take advise from Govt./ NGO/ extension agency etc	44 (36.67)	16 (13.33)	31 (25.83)	14 (11.67)	15 (12.50)	2.50	0.20
32. I never sold milk lower to production cost	22 (18.33)	9 (7.50)	27 (22.50)	24 (20.00)	38 (31.67)	3.39	0.58
33. I demand high prize at scarcity period.	38 (31.67)	12 (10.00)	36 (30.00)	16 (13.33)	18 (15.00)	2.70	0.29
34. I never use new technology for fodder production and fodder treatment.	25 (20.83)	6 (5.00)	48 (40.00)	8 (6.67)	33 (27.50)	3.15	0.61
35. I never listen/see any dairy related programme on mass media	31 (25.83)	14 (11.67)	35 (29.17)	13 (10.83)	27 (22.50)	2.93	0.40

Figures in parentheses indicate percentage
SDA= Strong disagreement, DA= Disagreement, UD= Undecided, A= Agreement and SA= Strong agreement

The average scores for the statements 1, 11, 16 and 26 were above the neutral score (i.e. 3). It means farmers who had insured their dairy animals were disinclined

towards training for dairy enterprise and supervision of dairy production with documentation. The statement 1 and 11 were positively worded indicating that insured dairy animal owners were inclined towards new method of dairying and willing to take loan for the expansion of dairy. The high score for the above statements showed that insured dairy farmers were not risk averse for the above aspects of dairying.

The statements with scores lower than the neutral score (i.e. 3) thus indicating inclination of farmers' towards adoption of the risk management tools reflected in these statements were 3, 4, 9, 10, 12, 13, 15, 17, 18, 22, 23, 25, 30, 31 and 33. This means insured dairy animal owners utilized or agreed to risk management tools like vaccination of animals, consulting others for dairying, future contract for dairying, use of modern equipments, take bank loan to start dairy business, production of milk with low cost, fodder cultivation on enough land, treatment with veterinarian, investment in crossbred animals, adopted hygienic measures for good quality of milk production, giving good bedding material to their dairy animals, given adequate concentrate and green fodder to pregnant and lactating animals, used high quality semen for AI, contact to government, NGO and extension agency for advise and demand of high price of milk during scarcity period.

4.2.7.3 Risk attitude of entire dairy farmers (pooled)

The statements 1,9,12,14,16,19 and 26 had higher average scores than the neutral (i.e. 3). The dairy farmers were thus disinclined towards future contract for dairying, start of dairy business with bank loan, need of life insurance policy and training for dairy business, investment for the expansion of dairy enterprise and supervision of dairying with documentation.

The dairy farmers were inclined towards newer method of dairy farming. The high average score indicated that dairy farmers were not risk averse for the above situation. The lower score of the statement indicated that farmers had a favourable disposition towards adopting of this risk management tool for their dairy farming.

The farmers were undecided on the use of readymade concentrate mixture, use of hay and silage and grazing of animals. This is because of the farmers were less aware about the good impact of above practices. Farmers were not aware of benefits of readymade concentrate, use of hay and silage and grazing of animals.

Table 35: Risk attitude of entire dairy farmers

Statement	SDA	DA	UD	A	SA	Ave. score	SD
1. I try new method in dairy farming	34 (14.17)	28 (11.67)	75 (31.25)	46 (19.17)	57 (23.75)	3.27	0.45
2. I do not involve in other business expect dairying	56 (23.33)	59 (24.58)	59 (24.58)	30 (12.50)	36 (15.00)	2.71	0.21
3. I never vaccinate my animals	97 (40.42)	48 (20.00)	44 (18.33)	19 (7.92)	32 (13.33)	2.34	0.14
4. I never consult for any one for dairying	47 (19.58)	83 (34.58)	65 (27.08)	13 (5.42)	32 (13.33)	2.58	0.29
5. My animals are low producers	57 (23.75)	36 (15.00)	85 (35.42)	43 (17.92)	19 (7.92)	2.71	0.34
6. My animals are not resistant to diseases	20 (8.33)	12 (5.00)	52 (21.67)	61 (25.42)	95 (39.58)	3.83	0.78
7. I never have enough cash for bad situation	59 (24.58)	36 (15.00)	70 (29.17)	38 (15.83)	37 (15.42)	2.83	0.28
8. Only I am interested in dairying from my family	73 (30.42)	38 (15.83)	66 (27.50)	23 (9.58)	40 (16.67)	2.66	0.27
9. I never do any future contract for my dairying	33 (13.75)	19 (7.92)	99 (41.25)	39 (16.25)	50 (20.83)	3.23	0.50
10. I use modern equipments for dairying	70 (29.17)	39 (16.25)	96 (40.00)	9 (3.75)	26 (10.83)	2.51	0.41
11. I take bank loan for expansion of dairying	72 (30.00)	25 (10.42)	78 (32.50)	22 (9.17)	43 (17.92)	2.75	0.36
12. I do not start dairying with bank loan	65 (27.08)	23 (9.58)	52 (21.67)	26 (10.83)	74 (30.83)	3.09	0.55
13. I do not produces milk with low cost	79 (32.92)	46 (19.17)	48 (20.00)	27 (11.25)	40 (16.67)	2.60	0.20
14. I do not have any life insurance policy	46 (19.17)	24 (10.00)	70 (29.17)	44 (18.33)	56 (23.33)	3.17	0.43

Table 35: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
15. I have enough land for fodder production	72 (30.00)	32 (13.33)	76 (31.67)	23 (9.58)	37 (15.42)	2.67	0.31
16. I never received any training for dairy enterprise	22 (9.17)	11 (4.58)	43 (17.92)	42 (17.50)	122 (50.83)	3.96	1.01
17. I never treat my animals with veterinarians	104 (43.33)	40 (16.67)	53 (22.08)	16 (6.67)	27 (11.25)	2.26	0.16
18. I am always ready to invest in crossbred	74 (30.83)	32 (13.33)	70 (29.17)	26 (10.83)	38 (15.83)	2.68	0.28
19. I never invest for expansion of dairy business	59 (24.58)	23 (9.58)	71 (29.58)	24 (10.00)	63 (26.25)	3.04	0.48
20. Other sources of income is not necessary for survival of my family	51 (21.25)	24 (10.00)	49 (20.42)	53 (22.08)	63 (26.25)	3.22	0.47
21. I allow my animals for grazing	49 (20.42)	31 (12.92)	53 (22.08)	29 (12.08)	78 (32.50)	3.23	0.58
22. I never practice hygienic measures for good quality of milk production	116 (48.33)	45 (18.75)	48 (20.00)	13 (5.42)	18 (7.50)	2.05	0.14
23. My animals never get good bedding	97 (40.42)	46 (19.17)	62 (25.83)	13 (5.42)	22 (9.17)	2.24	0.20
24. I never store feed and fodder for lean season	59 (24.58)	41 (17.08)	85 (35.42)	18 (7.50)	37 (15.42)	2.72	0.36
25. I never give adequate concentrate and green fodder to pregnant and lactating animals	127 (52.92)	25 (10.42)	34 (14.17)	22 (9.17)	32 (13.33)	2.20	0.17
26. I never supervise dairy production with documentation	28 (11.67)	13 (5.42)	90 (37.50)	26 (10.83)	83 (34.58)	3.51	0.71
27. I never use or sell manure as fertilizer	98 (40.83)	29 (12.08)	69 (28.75)	12 (5.00)	32 (13.33)	2.38	0.28
28. I never use ready-made concentrate mixture for animals	71 (29.58)	24 (10.00)	77 (32.08)	27 (11.25)	41 (17.08)	2.76	0.34
29. I never make hay and silage for animals	33 (13.75)	15 (6.25)	63 (26.25)	39 (16.25)	90 (37.50)	3.58	0.71

Table 35: Contd...

Statement	SDA	DA	UD	A	SA	Ave. score	SD
30. I never use high quality of semen for AI	134 (55.83)	22 (9.17)	61 (25.42)	6 (2.50)	17 (7.08)	1.96	0.27
31. I never take advise from Govt./ NGO/ extension agency etc	65 (27.08)	25 (10.42)	73 (30.42)	25 (10.42)	52 (21.67)	2.89	0.40
32. I never sold milk lower to production cost	46 (19.17)	15 (6.25)	56 (23.33)	44 (18.33)	79 (32.92)	3.40	0.61
33. I demand high prize at scarcity period.	70 (29.17)	28 (11.67)	76 (31.67)	24 (10.00)	42 (17.50)	2.75	0.34
34. I never use new technology for fodder production and fodder treatment.	44 (18.33)	11 (4.58)	103 (42.92)	18 (7.50)	64 (26.67)	3.20	0.62
35. I never listen/see any dairy related programme on mass media	57 (23.75)	26 (10.83)	72 (30.00)	20 (8.33)	65 (27.08)	3.04	0.50

Figures in parentheses indicate percentage
SDA= Strong disagreement, DA= Disagreement, UD= Undecided, A= Agreement and SA= Strong agreement

4.2.8 Risk management strategies

4.2.8.1 Risk management strategies of non-insured dairy farmers

The non insured dairy animal farmers' perception of risk management strategies are summarized in Table 36. The importance of risk management strategies were assessed by using scale with a five-point continuum (1-irrelevant to 5-relevant).

The Table 36 shows that there was a clear distinction between strategies perceived as very relevant and those perceived as not very relevant. Strategies like own agricultural land, having financial reserve, prevention of animal diseases, life insurance, off farm employment, good production technology, strict hygienic rule and livestock insurance were relevant risk management strategies for non-insured dairy animal owners as the above statement had high average score than the neutral. The risk management strategies like price contract for input, stock of adequate material, leasing or renting of machine and sharing of equipment were not relevant as these strategies had lower value than the neutral.

Table 36: Non-insured dairy farmers' perception of different sources of risk management strategies

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Carrying financial (cash) reserve	14 (11.67)	9 (7.50)	23 (19.17)	12 (10.00)	62 (51.67)	3.83	1.03
2. Enterprises diversification	29 (24.17)	5 (4.17)	41 (34.17)	7 (5.83)	38 (31.67)	3.17	0.65
3. Spreading sales of milk and milk products	33 (27.50)	12 (10.00)	34 (28.33)	15 (12.50)	26 (21.67)	2.91	0.38
4. Off-farm employment	17 (14.17)	8 (6.67)	39 (32.50)	14 (11.67)	42 (35.00)	3.47	0.68
5. Price contract for known buyers	26 (21.67)	7 (5.83)	28 (23.33)	25 (20.83)	34 (28.33)	3.28	0.52
6. Price contract for input	30 (25.00)	12 (10.00)	53 (44.17)	6 (5.00)	19 (15.83)	2.77	0.50
7. Livestock insurance	21 (17.50)	9 (7.50)	40 (33.33)	8 (6.67)	42 (35.00)	3.34	0.70
8. Life insurance	19 (15.83)	6 (5.00)	37 (30.83)	10 (8.33)	48 (40.00)	3.52	0.80
9. Crop insurance	20 (16.67)	15 (12.50)	44 (36.67)	6 (5.00)	35 (29.17)	3.18	0.60
10. Own agricultural land	16 (13.33)	4 (3.33)	17 (14.17)	15 (12.50)	68 (56.67)	3.96	1.16
11. Adequate production technology	18 (15.00)	3 (2.50)	46 (38.33)	11 (9.17)	42 (35.00)	3.47	0.73
12. Production at lowest possible cost	31 (25.83)	12 (10.00)	33 (27.50)	7 (5.83)	37 (30.83)	3.06	0.58
13. Consultancy services	27 (22.50)	8 (6.67)	39 (32.50)	14 (11.67)	32 (26.67)	3.13	0.51
14. Labour force (quality and quantity)	25 (20.83)	17 (14.17)	45 (37.50)	9 (7.50)	24 (20.00)	2.92	0.44
15. Stock of adequate material	32 (26.67)	19 (15.83)	33 (27.50)	6 (5.00)	30 (25.00)	2.86	0.45
16. Leasing or renting machinery	37 (30.83)	4 (3.33)	48 (40.00)	7 (5.83)	24 (20.00)	2.81	0.50
17. Applying strict hygienic rule	19 (15.83)	7 (5.83)	41 (34.17)	16 (13.33)	37 (30.83)	3.38	0.61
18. Prevent / reduce livestock diseases	7 (5.83)	11 (9.17)	30 (25.00)	19 (15.83)	53 (44.17)	3.83	0.86
19. Cooperative marketing	16 (13.33)	10 (8.33)	46 (38.33)	13 (10.83)	35 (29.17)	3.34	0.60
20. Keeping fixed cost low	18 (15.00)	16 (13.33)	52 (43.33)	8 (6.67)	26 (21.67)	3.07	0.54
21. Use of economic information and consultancy services	22 (18.33)	16 (13.33)	38 (31.67)	12 (10.00)	32 (26.67)	3.13	0.50
22. Shared equipment partnership	26 (21.67)	12 (10.00)	47 (39.17)	15 12.50	20 (16.67)	2.93	0.42

Figures in parentheses indicate percentage

4.2.8.2 Risk management strategy of insured dairy farmers

The most relevant risk management strategies for insured dairy animal owners were prevention (vaccination) of livestock diseases and livestock insurance. Since all the farmers in this category had insured their animals, it is obvious to find insurance of livestock to be the most relevant strategy for risk management for them. Other risk management strategies for insured dairy animal owners were carrying financial reserve, enterprise diversification, price contract from known buyers, life insurance, own agricultural land and consultancy services. The respondents of insured dairy animals perceived that price contract for input, labour force, stock of adequate material and cooperative marketing were not relevant risk management strategies as these strategies had lower value than the neutral.

Table 37: Insured dairy animal farmers' perception of different sources of risk management strategies

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Carrying financial (cash) reserve	12 (10.00)	10 (8.33)	27 (22.50)	15 (12.50)	56 (46.67)	3.78	0.91
2. Enterprises diversification	18 (15.00)	8 (6.67)	38 (31.67)	13 (10.83)	43 (35.83)	3.46	0.70
3. Spreading sales of milk and milk products	21 (17.50)	7 (5.83)	40 (33.33)	18 (15.00)	34 (28.33)	3.31	0.55
4. Off-farm employment	13 (10.83)	5 (4.17)	41 (34.17)	24 (20.00)	37 (30.83)	3.56	0.62
5. Price contract for known buyers	19 (15.83)	9 (7.50)	32 (26.67)	21 (17.50)	39 (32.50)	3.43	0.60
6. Price contract for input	27 (22.50)	14 (11.67)	48 (40.00)	11 (9.17)	20 (16.67)	2.86	0.43
7. Livestock insurance	9 (7.50)	5 (4.17)	25 (20.83)	16 (13.33)	65 (54.17)	4.03	1.09
8. Life insurance	16 (13.33)	10 (8.33)	17 (14.17)	8 (6.67)	71 (59.17)	3.95	1.22
9. Crop insurance	20 (16.67)	6 (5.00)	46 (38.33)	19 (15.83)	29 (24.17)	3.26	0.52
10. Own agricultural land	14 (11.67)	9 (7.50)	28 (23.33)	22 (18.33)	47 (39.17)	3.66	0.75
11. Adequate production technology	10 (8.33)	5 (4.17)	51 (42.50)	18 (15.00)	36 (30.00)	3.54	0.66
12. Production at lowest possible cost	21 (17.50)	14 (11.67)	38 (31.67)	7 (5.83)	40 (33.33)	3.26	0.65
13. Consultancy services	25 (20.83)	7 (5.83)	26 (21.67)	23 (19.17)	39 (32.50)	3.37	0.60

Table 37: Contd...

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
14. Labour force (quality and quantity)	32 (26.67)	15 (12.50)	33 (27.50)	12 (10.00)	28 (23.33)	2.91	0.40
15. Stock of adequate material	35 (29.17)	10 (8.33)	45 (37.50)	9 (7.50)	21 (17.50)	2.76	0.42
16. Leasing or renting machinery	32 (26.67)	6 (5.00)	41 (34.17)	11 (9.17)	30 (25.00)	3.01	0.50
17. Applying strict hygienic rule	19 (15.83)	8 (6.67)	38 (31.67)	8 (6.67)	47 (39.17)	3.47	0.78
18. Prevent / reduce livestock diseases	4 (3.33)	3 (2.50)	35 (29.17)	16 (13.33)	62 (51.67)	4.08	1.05
19. Cooperative marketing	25 (20.83)	15 (12.50)	53 (44.17)	7 (5.83)	20 (16.67	2.85	0.50
20. Keeping fixed cost low	17 (14.17)	7 (5.83)	55 (45.83)	10 (8.33)	31 (25.83)	3.26	0.63
21. Use of economic information and consultancy services	18 (15.00)	10 (8.33)	36 (30.00)	18 (15.00)	38 (31.67)	3.40	0.59
22. Shared equipment partnership	22 (18.33)	14 (11.67)	49 (40.83)	12 (10.00)	23 (19.17)	3.00	0.47

Figures in parentheses indicate percentage

4.2.8.3 Risk management strategies of all the dairy farmers

It is evident from the information given in Table 38 that the most relevant strategies for the dairy farmers (in descending order) were vaccination of animals, having own agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. The dairy farmers perceived that price contract for input, labour force, stock of adequate material, leasing or renting machinery and shared equipment partnership were not relevant risk management strategies. Beal (1996) stated that risk management strategies adopted by farm managers reflect their personal perceptions of risk. Wilson *et al.* (1988) found high scores for risk management methods relating to communication with hired labour, use of consultants, use of management information systems, and forward contracting. Results from Patrick and Musser (1997) showed that the large-scale US Corn Belt farmers saw liability insurance, financial / credit reserves, debt / leverage management, and (also) forward contracting as important managerial responses to risk. Both studies found low scores for off-farm employment, indicating that this was not seen an important risk management strategy.

Table 38: Entire dairy farmers' perception of different sources of risk management strategies

Statement	Irrelevant	Somewhat irrelevant	Undecided	Somewhat relevant	Relevant	Average score	SD
1. Carrying financial (cash) reserve	26 (10.83)	19 (7.92)	50 (20.83)	27 (11.25)	118 (49.17)	3.80	0.97
2. Enterprises diversification	47 (19.58)	13 (5.42)	79 (32.92)	20 (8.33)	81 (33.75)	3.31	0.67
3. Spreading sales of milk and milk products	54 (22.50)	19 (7.92)	74 (30.83)	33 (13.75)	60 (25.00)	3.11	0.46
4. Off-farm employment	30 (12.50)	13 (5.42)	80 (33.33)	38 (15.83)	79 (32.92)	3.51	0.65
5. Price contract for known buyers	45 (18.75)	16 (6.67)	60 (25.00)	46 (19.17)	73 (30.42)	3.36	0.56
6. Price contract for input	57 (23.75)	26 (10.83)	101 (42.08)	17 (7.08)	39 (16.25)	2.81	0.46
7. Livestock insurance	30 (12.50)	14 (5.83)	65 (27.08)	24 (10.00)	107 (44.58)	3.68	0.88
8. Life insurance	35 (14.58)	16 (6.67)	54 (22.50)	18 (7.50)	119 (49.58)	3.73	0.99
9. Crop insurance	40 (16.67)	21 (8.75)	90 (37.50)	25 (10.42)	64 (26.67)	3.22	0.55
10. Own agricultural land	30 (12.50)	13 (5.42)	45 (18.75)	37 (15.42)	115 (47.92)	3.81	0.94
11. Adequate production technology	28 (11.67)	8 (3.33)	97 (40.42)	29 (12.08)	78 (32.50)	3.50	0.69
12. Production at lowest possible cost	52 (21.67)	26 (10.83)	71 (29.58)	14 (5.83)	77 (32.08)	3.16	0.62
13. Consultancy services	52 (21.67)	15 (6.25)	65 (27.08)	37 (15.42)	71 (29.58)	3.25	0.54
14. Labour force (quality and quantity)	57 (23.75)	32 (13.33)	78 (32.50)	21 (8.75)	52 (21.67)	2.91	0.41
15. Stock of adequate material	67 (27.92)	29 (12.08)	78 (32.50)	15 (6.25)	51 (21.25)	2.81	0.42
16. Leasing or renting machinery	69 (28.75)	10 (4.17)	89 (37.08)	18 (7.50)	54 (22.50)	2.91	0.50
17. Applying strict hygienic rule	38 (15.83)	15 (6.25)	79 (32.92)	24 (10.00)	84 (35.00)	3.42	0.69
18. Prevent / reduce livestock diseases	11 (4.58)	14 (5.83)	65 (27.08)	35 (14.58)	115 (47.92)	3.95	0.95
19. Cooperative marketing	41 (17.08)	25 (10.42)	99 (41.25)	20 (8.33)	55 (22.92)	3.10	0.53
20. Keeping fixed cost low	35 (14.58)	23 (9.58)	107 (44.58)	18 (7.50)	57 (23.75)	3.16	0.58
21. Use of economic information and consultancy services	40 (16.67)	26 (10.83)	74 (30.83)	30 (12.50)	70 (29.17)	3.27	0.54
22. Shared equipment partnership	48 (20.00)	26 (10.83)	96 (40.00)	27 (11.25)	43 (17.92)	2.96	0.44

Figures in parentheses indicate percentage

4.2.9 Dairy farmers' goals

The schedule contained a list of 12 often expressed goals among dairy farmers. Farmers were asked to select the most important goals from the list. Table 39 shows percentage of responses recorded for each goal. Most of the non-insured dairy animal farmers' ranked certain and stable income, inherited business, produce high quality food, to maximize profit and time for family living and concern for children among their top five goals (Fig. 4.11). Insured dairy animal owners give highest priority to certain and stable incomes, inherited business, maximize profit, produce high quality food and time for family living, concerns for children. If we combined both the groups then the ranking of dairy farmers' goal is about the same as the non-insured dairy animals. As often found in studies of farmers' goal, work with animals ranked lowest among all the group of dairy farmers. These results were supported by earlier studies (e.g. Gasson *et al*., 1988) which revealed that farmers had several goals – not only one.

Table 39: Distribution of respondents according to their dairy farming goal

Farmers goal	Non-insured		Insured		Total	
	No. of respondents	Rank	No. of respondents	Rank	No. of respondents	Rank
1. Certain and stable income	97 (80.8)	1	83 (69.2)	1	180 (75.0)	1
2. Produce high quality food	75 (62.5)	3	62 (51.7)	4	137 (57.1)	3
3. Inherited business	86 (71.7)	2	71 (59.2)	2	157 (65.4)	2
4. Time for family living, concerns for children	49 (40.8)	5	55 (45.8)	5	104 (43.3)	5
5. Improve the farm for next generation	22 (18.3)	8	33 (27.5)	8	55 (22.9)	8
6. Have possibility to some leisure	11 (9.2)	10	12 (10.0)	11	23 (9.6)	11
7. Reduce debt, become free of debt	9 (7.5)	11	16 (13.3)	10	25 (10.4)	10
8. Continue to be a dairy farmer	31 (25.8)	7	40 (33.3)	7	71 (29.6)	7
9. Maximize profit	53 (44.2)	4	68 (56.7)	3	121 (50.4)	4
10. Work with animals/crops	5 (4.2)	12	8 (6.7)	12	13 (5.4)	12
11. Social contacts	17 (14.2)	9	25 (20.8)	9	42 (17.5)	9
12. Higher private consumption	38 (31.7)	6	47 (39.2)	6	85 (35.5)	6

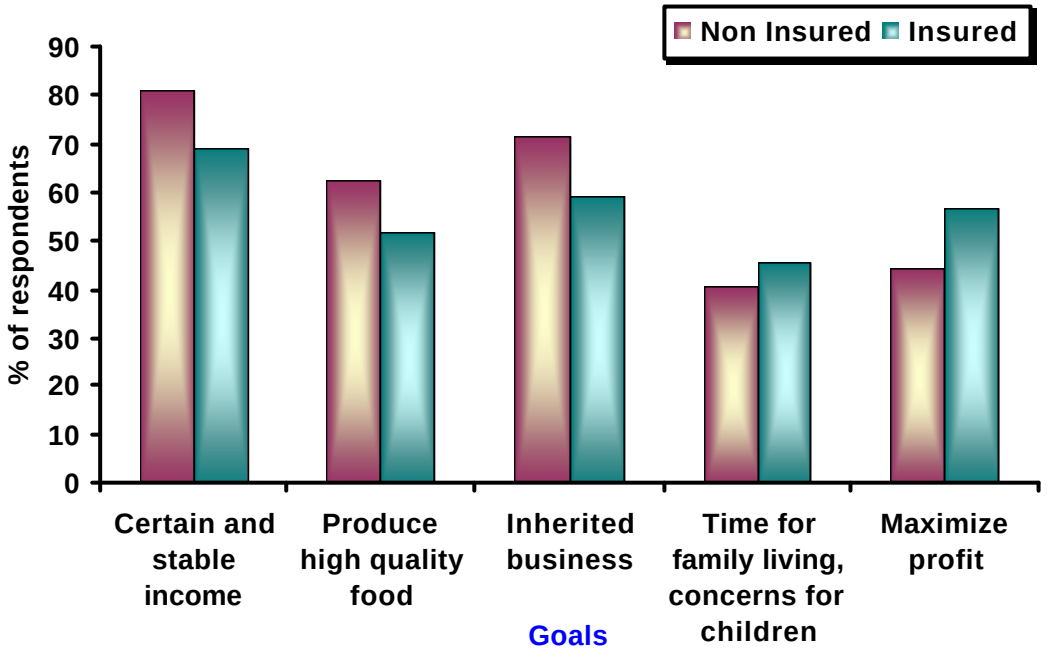


Fig. 4.11 : Top five goals of dairy farmers

Figures in parentheses indicate percentage

4.3 WILLINGNESS TO PAY FOR LIVESTOCK INSURANCE

To know the willingness to pay (WTP) for cattle and buffalo insurance an insurance scheme was presented to non-insured dairy animal owners in the group of 5 to 6. This cattle and buffalo insurance scheme was to compensate farmers almost the full value (80% – 100%) of their animals after verifying that the cause of their animals' death was not due to personal negligence or poor management. The scheme was sold through membership tickets per animal per year at different prices for a maximum of 5 years (useful productive period) in the life of an animal. Farmers were then asked whether they will buy the ticket. Farmers who expressed their willingness to participate in the scheme was asked to state the exact amount of money that they would pay for each ticket, as well as the cattle breeds and number of animals that they would insure in such scheme.

They were asked the amount they were willing to pay for participating in the cattle and buffalo insurance scheme. Approximately seventy nine per cent of respondents were willing to participate in this scheme, whereas, 17 per cent respondents were not willing to purchase the insurance ticket due to different reasons. The remaining 4 per cent dairy farmers were undecided about their participation in the scheme (Fig. 4.12).

Table 40: Distribution of respondents according to their willingness to pay for cattle and buffalo insurance

Will buy the membership ticket	No. of. respondents	per cent
Yes	95	79.2
No	20	16.7
Can't decide	5	4.2
Total	120	100

4.3.1 Reasons for non-willingness

The dairy farmers who were not willing to participate in the scheme cited some reasons for not doing so. These reasons were such as no need of insurance (36 per cent), desire to shift from risky dairy production system to less risky non agricultural small and medium enterprises (28 per cent), don't have enough money (20 per cent), and the insurance scheme being costly (8 per cent). Eight per cent of dairy farmers did not specify any reason for their unwillingness (Fig. 4.13).

Table 41: Distribution of respondents according to their reason for non-willingness

Reason for non-participation	No. of. respondents	per cent
Desire to shift from risky livestock production system to 'less risky' non-agricultural Small and Medium Enterprises (SMEs)	7	28
Don't have enough money	5	20
Insurance scheme is too costly	2	8
No need of insurance	9	36
Any other reason	2	8
Total	25	100

4.3.2 Willingness to pay for different dairy animals insurance

The dairy farmers who agreed to purchase the insurance ticket differed in terms of number and breed of dairy animal which they wanted to insured (table 42). Most of the dairy farmers agreed to insure their crossbred cows and buffaloes and the maximum number of dairy animals they agreed to insure was three (but also a small proportion of respondents were also willing to insure 4 and 5 animals).

The distribution of dairy farmers who agreed to purchase insurance ticket at different prices is presented in table 42. Around 36 per cent, 89 per cent and 68 per cent of dairy farmers who were willing to purchase insurance ticket for indigenous cows, crossbreds and buffaloes, respectively.

Table 42: Distribution of respondents according to their willingness to pay for different dairy animals insurance

No. of Animals	No. of Indigenous cow owners	No. Crossbred cow owners	No. Buffalo owners
1	19 (67.9)	21 (37.5)	17 (23.9)
2	9 (32.1)	30 (53.6)	23 (32.4)
3	-	3 (5.4)	10 (14.1)
4	-	2 (3.6)	10 (14.1)
5	-	-	6 (8.5)
6	-	-	2 (2.8)
8	-	-	2 (2.8)
Total	28 (100)	56 (100)	71 (100)

Figures in parentheses indicate percentage

4.3.3 Amount for livestock insurance

The amount of premium that respondents were willing to pay varies across different breeds of dairy animals. Around fourteen per cent of dairy farmers agreed to insure their indigenous cows at the premium of Rs 100 which was the lowest bid for premium. Fifty per cent, 32 per cent, and 4 per cent indigenous dairy cow owners agreed to pay Rs. 300, Rs. 500 and Rs. 700, respectively, as premium for insuring their animals. The highest bid price of Rs. 700 for indigenous cow was agreed upon by only 4 per cent of the dairy farmers. The lower and upper bid prices for crossbred cow was Rs. 300 and R. 1500, which were agreed upon by 12.5 and 5 per cent of owners, respectively. Within this range, different proportions of owners were willing to purchase insurance ticket at different premium bid prices (ranging from 23 per cent for premium bid of Rs. 500 to 4 per cent for premium bid of Rs. 1300). They were ready to spend more money on insurance for crossbred cows because of high value of these animals and their greater vulnerability to different risks. A total of 71 buffalo owners agreed to spend an amount within the range of Rs 100 to 1500 as premium per year. Most of the (62 per cent) buffalo owners agreed to spend Rs. 500 to 700 as a premium per animal per year (Fig. 4.14).

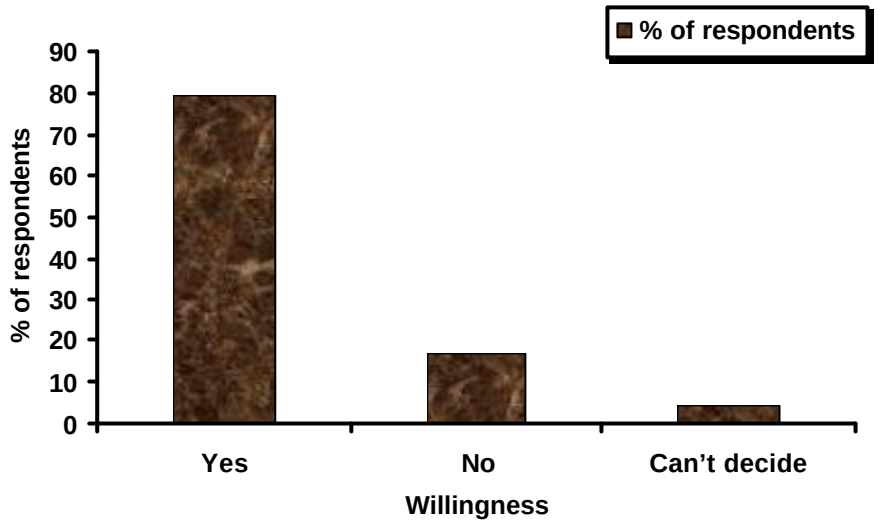
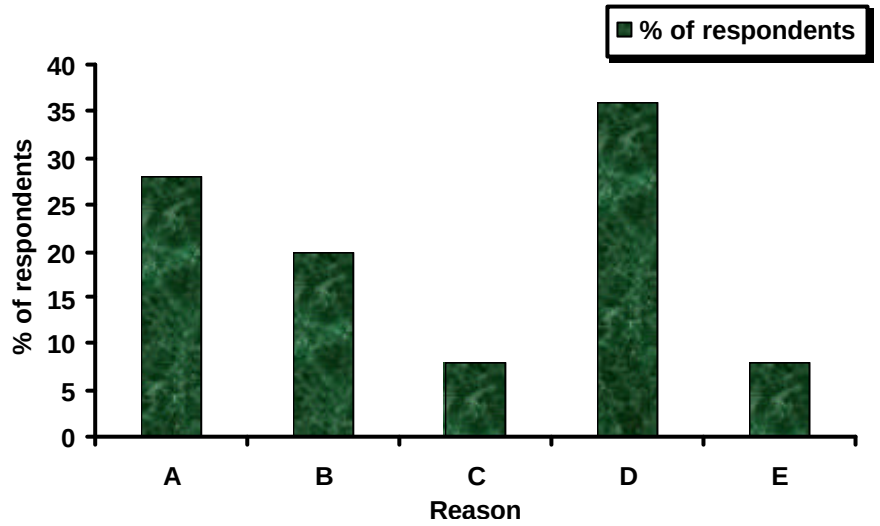


Fig. 4.12 : WTP for dairy animal insurance



A : Desire to shift from risky livestock production system to 'less risky' non-agricultural Small and Medium Enterprises (SMEs); B : Don't have enough money; C : Insurance scheme is too costly; D : No need of insurance; E : Any other reason

Fig. 4.13 : Reason for non-willingness for cattle and buffalo insurance

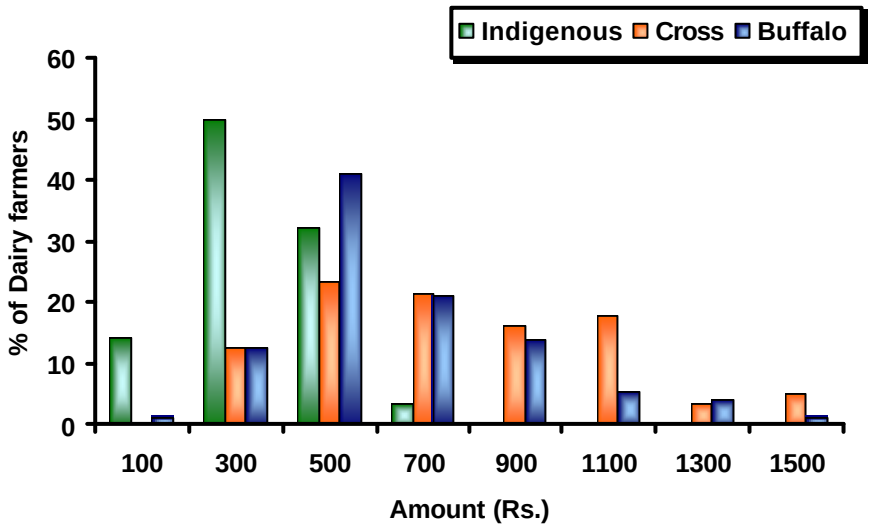


Fig. 4.14 : Amount willing to pay for cattle and buffalo insurance

Table 43: Distribution of respondents according to amount they were willing to pay for livestock insurance

Type of animal	Amount (Rupees)								Total
	100	300	500	700	900	1100	1300	1500	
Indigenous	4	14	9	1	-	-	-	-	28
	(14.3)	(50.0)	(32.1)	(3.6)					(100)
Cross	-	7	13	12	9	10	2	3	56
		(12.5)	(23.2)	(21.4)	(16.1)	(17.9)	(3.6)	(5.3)	(100)
Buffalo	1	9	29	15	10	4	3	1	71
	(1.4)	(12.7)	(40.9)	(21.1)	(14.1)	(5.63)	(4.2)	(1.4)	(100)

Figures in parentheses indicate percentage

4.3.4 Willingness for number of years to pay for livestock insurance

More than 50 per cent owners were ready to purchase insurance ticket for 3 to 4 years (table 44). About 21 per cent cattle and buffalo owners showed their interest in insurance for 5 year policy. Only 7 per cent and 16 per cent dairy farmers were willing to insure their animals for 1 and 2 year policy, respectively.

Table 44: Distribution of respondents according to willingness for no. of years to pay for livestock insurance

No of years	No. of. respondents	per cent
1	7	7.4
2	15	15.8
3	18	18.9
4	35	36.8
5	20	21.1

4.3.5 Determinants of farmers' mean WTP for cattle and buffalo insurance scheme

The mean WTP per year for the indigenous cow, crossbred cow and buffalo were Rs. 246, 771 and 656, respectively. It is clearly evident from the table 45 that mean WTP was higher for the crossbred cows than buffaloes and indigenous cows. Dairy farmers were know that crossbreds were more vulnerable to different diseases

than the other breeds of dairy animals. Farmers were willing to spend more money on crossbreds than buffalo and indigenous cow.

Table 45: Mean WTP values for different breeds

Sl. No.	Type of animal	Amount (Rs.)
1	Indigenous cow	246.43
2	Crossbred cow	771.43
3	Buffalo	656.34

Livestock insurance in India is basically established with a subsidized premium under different government schemes to help farmers to better manage risk. Despite, this intension only a few farmers have so far adopted insurance coverage for their livestock. This may be due to a number of factors, such as a lack of information on, or awareness of, the insurance scheme, a low level of education among farmers, poor rural infrastructure (making communication difficult and limiting access to insurance), affordability, degree of farmers' risk aversion, other subsidiary occupation and diversification of farm enterprises. These and other factors that could influence the adoption of insurance by dairy farmers are discussed in this section.

All the independent variables included in the regression model were individually statistically significant in explaining variations in the mean WTP for cattle buffalo insurance scheme (Table 46).

The most important variables expected to influence the adoption of dairy livestock insurance were gender of dairy farmer, education, caste of the farmer, number of dependent (family size), occupation, income of the family, experience in dairy farming, expected next breed of purchase and investment in next purchase of dairy animal. Measures of the impact of moral hazard on the provision of insurance were not considered as government offered and subsidized the insurance scheme. Moral hazard refers to an individual's change in behavior after having taken out an insurance policy in a way that increases the probability of receiving an indemnity payment (Miranda and Glauber, 1997).

Table 46: Estimation Results (OLS Regression)

Variable	Coefficient	Standard error	t-statistic	Significance level
Gender	-.262	9.541	-2.166*	.033
Education	.352	3.544	2.032*	.045
Cast	.125	6.092	1.208*	.230
No. Of Dependent	.094	3.149	.943*	.348
Occupation	.197	9.686	1.444*	.152
Total Income	-.309	.000	-1.836*	.070
Dairy Farming Experience	.371	.717	2.937*	.004
Next Breed	.081	14.688	.653*	.515
Rs For Next Purchase	.140	.001	.746*	.458

Adjusted R square = 0.159, n= 95, F=2.970, * significant at1 per cent level.

Gender gives an indication that whether male or female involved in dairy farming and who will take the measure decision like livestock insurance. It was assumed that male dairy farmers mostly take the decision regarding dairy farming. Education may promote an understanding of the effects of risk and hence may increase the demand for insurance; on the other hand, increasing education levels are associated with an increase in transferable human capital, facilitating greater risk taking by individuals with lower risk aversion (Esho *et al*, 2003). More number of dependents increases the responsibility of the farmer to avoid potential losses and with it the demand for insurance increases with number of dependents in the family. As farmers participate in other occupation as a risk management strategy, the probability of using insurance may increase. Dairy farming experience is expected to have a positive impact on the likelihood of livestock insurance adoption because awareness of various sources of risk management strategies increases with farming experience, which increases the probability of adopting insurance. With increase in income there should be more investment in livestock insurance. Purchase of good breed of animal of high value will favourably influence the dairy farmers' demand for livestock insurance.

The variables which positively influenced the mean WTP values were education, caste of the farmer, number of dependents (family size), occupation, experience in dairy farming, expected next breed of purchase and investment in next purchase of dairy animal The positive signs of estimated coefficients associated with these variables indicate that greater the values of these variables, higher will be the amount that respondents will be willing to pay to participate in livestock insurance. The negative signs of gender of dairy farmer and income of the family indicate that greater the value of these variables the lower will be the amount that farmers will be willing to pay to insure their animals.

The education level of dairy farmer has a positive coefficient estimate indicating that the WTP for purchasing cattle and buffalo insurance increases as the level of formal education of the farmer increases.This is supported by the finding of Esho *et al* (2003) who observed that education (completing secondary school) through improving cognition enables a better assessment of risk and hence results in increased demand for insurance. The positive effect of education on farmers' demand for insurance was also reported by Vandeveer (2001). Bullock *et al.* (1994) found that education was negatively related to a farmer's willingness to take risk. In the study by Woodburn *et al.* (1995), however, education was positively related to a farmer's willingness to take risk.

Involvement of dairy farmers in additional occupation other than dairy farming has a positive coefficient estimate implying that farmers' engagement in off-farm investment increases the amount they will be willing to pay for purchasing livestock insurance. Moscardi and De Janvry (1977), in their study of attitudes toward risk among peasants in Mexico, found that the higher the off-farm income the higher the capacity to assume risk in agricultural production. Mishra and Goodwin (1997) reported a positive correlation between off-farm employment and farm income variability indicating that off-farm investment helps many farm households to diversify their income risks. Dairy farmers who are diversified may experience lower income variability than non-diversified farmers because the income loss in one enterprise may be compensated for by a higher income in another enterprise. Jarvie

and Nieuwoudt (1988) reported that use of other strategies, such as on-farm diversification and generating off farm income, may reduce the use of insurance as a means of risk management. Blank and McDonald (1996) reported that more diversification is practiced in the absence of insurance.

Dairy farming experience is positively related to the decision to purchase livestock insurance. It appears, therefore, that older and more experienced dairy farmers are more willing to purchase insurance. Farmers with such characteristics might have acquired enough knowledge that great loss will occur if they don't insure their animals. Results of the studies by Jarvie and Nieuwoudt (1988) and Vandeveer (2001), also indicate that younger farmers, or those with less experience, were less likely to buy insurance.

The WTP for the cattle and buffalo insurance scheme was higher among female farmers compared to the males. This was due to the some government schemes in which females members were encouraged to participate in the livestock insurance. The WTP for the insurance scheme was higher among the farmers who were buying cross breeds cows/buffaloes compared to the indigenous cattle. This shows the higher risk perception associated with the exotic breeds and buffaloes and hence the need to insure it compared to the other breeds. The results also show a higher WTP for the insurance scheme among the general category, compared to the other backward and schedule caste category. This variation can be explained by the high awareness for cattle and buffalo insurance among general category with high status in the society. The more information a farmer has about insurance the more likely he will use livestock insurance.

4.4 FACTORS RELATED TO CATTLE AND BUFFALO INSURANCE

4.4.1 Cattle and Buffalo Insurance

To know the existing practices in cattle and buffalo insurance 120 dairy farmers were selected from the study area who insured their cattle and buffaloes. The trend in cattle and buffalo insurance is presented in table 47. It was mandatory

for all animals purchased through bank loan or any government scheme be insured. It was observed that animals bought through bank loan received some subsidy. It is interesting to see that number of financed buffaloes were more than other dairy animals.

All types of cattle and buffalo breeds like indigenous, crossbred or exotic are covered under different insurance schemes. Cattle and buffalo insurance cover the death of animals due to diseases or accidents. It also covers the risk of permanent total disability with extra premium. Risks which were not covered by insurance companies are death due to personal negligence, malevolent intension, deliberate killing of animal and other causes which were not declared in the policy, occurrence of diseases before policy etc. Every insurance company supplies a list of risk which is not covered by them. Insurance companies, before issuing any policy for cattle and buffalo insurance, inspect the animal through their agents and ascertain whether the animal has suffered from any diseases in the past. Agents also see the degree of risk associated with cattle and buffalo. The insurance companies scrutinize all the matters carefully and follow their own guidelines before issuing an insurance policy for cattle and buffalo. A health certificate of proposed animal to be insured is required from the veterinary officer (annexure-2). The health certificate has a number of information about the animal which is certified by veterinary officer. The insurance companies will not issue any policy of dairy animal insurance without this health certificate from veterinarian.

The premium rate under the national livestock insurance scheme is 2 per cent for annual policy and 5.1 per cent for three year policy. This excludes 50 per cent premium subsidy governed by central government. Under the government scheme the premium rate was 2.25 per cent for yearly and 6.75 per cent for three year policy. General insurance schemes which have no government involvement - charge premium rate of about 4 per cent and 12.5 per cent for one year and three year policy, respectively. Insurance companies also charge a service tax of 12.36 per cent on the premium amount. In the long term policy (i.e. 3 year), insurance companies give some discount in the premium. Rate of premium for general

insurance may vary across different companies according to number of animals and coverage of risk. Cattle and buffalo insurance policy is generally issued for one and three year.

Under national livestock insurance scheme, the policy was issued for high yielding cattle and buffaloes in which only 2 dairy animals were insured by a single owner. If a owner insured his/her dairy animal for one year policy then he/she will not be shifted to three year policy after the end of year.

The sum amount insured for cattle and buffalo under government insurance scheme, was fixed by the purchase committee. In other cases, the value of cattle and buffalo was fixed by the veterinary officer. The amount of indemnity varies from 70 to 100 per cent of sum insured according to causes of claim. For instance as in case of death, the veterinary officer declares the market value of the dairy animal at the time of death or sum insured whichever is less. In case of permanent total disability (PTD), the amount of indemnity is 75 per cent of sum insured, whereas, in case of death of animal due to chronic cases like Fasciolosis, the depreciation cost was more. If the cattle or buffalo was purchased under government scheme, the amount of indemnity was declared by the purchase committee.

An identification number is issued to cattle and buffalo by the insurance company after the acceptance of policy. The insured cattle and buffalo have a printed button type ear tag as a mark of identification (Fig. 4.15 and Fig. 4.16). This ear tags bears a number i.e. identification number which was put by the veterinarian when supplied by insurance company. Cattle and buffalo insurance policy is not automatically transferable. After the approval of insurance agency**,** the policies may be transferred to new owner.

It is clearly evident from table 47 that 67 per cent of all the insured animals were buffaloes. Around fifty per cent of insured buffaloes were insured under NLIS, whereas, 34 per cent and 16 per cent of buffaloes were insured under government scheme and general insurance, respectively. Crossbred cows comprised 31 per cent of all insured animals, while proportion of indigenous cows among insured animals was negligible (1.5 per cent). The distribution of crossbred cows insured under

Table 47. Particulars about different aspects of insurance

Type of animal	Total no. of adult animal	No. of financed animal	Total no of insured animals	Type of insurance			Year insurance		No. of claim			
				Govt.	NLIS	General	1 yr	3 yr	Govt.	NLIS	General	Total
Indigenous cow	90	3	3	3				3	3	-	-	3
	(12.8)	(3.5)	(1.4)	(5.1)	-	-	-	(1.9)	(5.6)			(3.0)
Crossbred cow	95	8	66	8	54	4	15	51	7	3	3	13
	(13.5)	(9.4)	(31.4)	(13.6)	(43.2)	(15.4)	(33.3)	(30.9)	(13.0)	(10.7)	(16.7)	(13.0)
Buffalo	519	74	141	48	71	22	30	111	44	25	15	84
	(73.7)	(87.1)	(67.1)	(81.4)	(56.8)	(84.6)	(66.7)	(67.3)	(81.5)	(89.3)	(83.3)	(84.0)
Total	704	85	210	59	125	26	45	165	54	28	18	100
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

Figures in parentheses indicate percentage

Fig. 4.15 : Buffalo with ear tag

Fig. 4.16 : Ear tag showing identification number

government scheme, NLIS and general insurance were 12 per cent, 82 per cent and 6 per cent, respectively. All the indigenous cows were insured through government schemes. Most of the dairy farmers insured their animals under NLIS. More than 2/3 of the policies for crossbred cows and buffaloes were long term (i.e. for 3 years). All the indigenous cows were insured for three year policies. Within the breed crossbred cows (70 per cent) were insured more than other milch animals because there is more risk associated with these animals.

The number of claims was 100 per cent in case of indigenous cows, whereas, it was about 60 per cent in case of buffaloes. Claims were only 20 per cent for crossbred cows. Percentage of claims in case of crossbred cows and buffaloes insured under government scheme were more than 50 per cent. Similar figures for crossbred cows and buffaloes insured under NLIS were 23 per cent and 30 per cent, respectively.

4.4.2 Causes of insurance claim

Table 48 reveals the causes for which insurance was claimed by dairy farmers. Thirty eight per cent of respondents claimed for acute tympany, 18 per cent for epidemic diseases, 12 per cent for enteritis, 11 per cent for natural calamity and accident, 8 per cent for pulmonary and liver diseases, 7 per cent for milk fever and 6 per cent for permanent total disability (Fig. 4.17).

Table 48: Distribution of insured dairy animal farmers according to causes of insurance claim

Diseases	Number	per cent
(1) Acute tympany	38	38
(2) Epidemic	18	18
(3) Natural calamity and accident	11	11
(4) Pulmonary and liver disease	8	8
(5) Enteritis	12	12
(6) Milk fever	7	7
(7) PTD	6	6
Total	100	100

4.4.3 Time taken for different steps in claim procedure

There are different steps of claim settlement procedure which take varying time periods for completion (Table 49). The mean time taken to settle the claim for loanees was 105 days, whereas, for non-loanees the mean time for settlement of claim was 77 days. The steps which consumed maximum time in claim settlement procedure were dispatch of cheque, processing by the bank and certification by veterinarian. Average 29 days were taken in dispatch of cheque, 22 days in processing by bank, 15 days in getting certification from veterinarians, 14 days for voucher book to insurance company and 7 days in claim submission to bank.

Table 49: Mean time and standard deviation of different steps in claim procedure

Sl. No.	Steps of claim procedure	Mean time (days)	Standard Deviation
1	Certificate from veterinarian	15	4.24
2	Submit claim to bank	6.5	4.95
3	Bank send form to insurance company	6	1.41
4	Processing & send voucher to bank	22	11.31
5	Voucher back to insurance company	14	5.66
6	Dispatch of cheque	29	15.56
7	Total	104.5	45.96

The delay at processing stage is understood as it is at this stage the credibility of the claim is established. The delay in sending the voucher was however, long which need to be reduced as was also reported in an earlier study (Prasad and Rao, 1992b). Lack of adequate field staff with the insurance company and dependence on the departmental staff also seems to create problems of coordination and mutual apprehension resulting in confusion and delay (Shenoy *et al.*, 1987).

4.4.4 Satisfaction with different aspects of cattle and buffalo insurance

Table 50 shows the satisfaction of insured dairy animal owners with different aspects of cattle and buffalo insurance. Nearly 58 per cent of respondents were unsatisfied with the insurance procedure. About 50 per cent respondents were

unsatisfied with coverage of risk and indemnity period. Half of the dairy animal owners were undecided on quality of loss estimation. Average score for all the aspects of cattle and buffalo insurance was less than neutral which indicates dairy farmers were not satisfied with the different aspects of livestock insurance. The standard deviation is less than one indicating that there was high level of consensus among the dairy farmers in respect to satisfaction of cattle and buffalo insurance.

Table 50: Distribution of respondents according to satisfaction with cattle and buffalo insurance

Statement	No. of Respondents					Average	SD
	CUS	US	UD	S	CS		
					Score		
1. Coverage of risks	18 (15.00)	44 (36.67)	31 (25.83)	17 (14.17)	10 (8.33)	2.64	0.25
2. Quality of insurance agents	27 (22.50)	21 (17.50)	29 (24.17)	25 (20.83)	18 (15.00)	2.88	0.27
3. Livestock insurance premium	15 (12.50)	30 (25.00)	38 (31.67)	23 (19.17)	14 (11.67)	2.93	0.31
4. Indemnity period	41 (34.17)	18 (15.00)	53 (44.17)	5 (4.17)	3 (2.50)	2.26	0.50
5. Quality of loss estimation	31 (25.83)	17 (14.17)	61 (50.83)	7 (5.83)	4 (3.33)	2.47	0.58
6. Quality of insurance procedure	35 (29.17)	34 (28.33)	25 (20.83)	14 (11.67)	12 (10.00)	2.45	0.13

Figures in parentheses indicate percentage
CUS=Completely unsatisfied, US= Unsatisfied, UD= Undecided, S=Satisfied and CS= Completely satisfied

4.4.5 Credit behaviour

The average time in getting bank loan for dairy farming was 2.5 months (standard deviation 0.77). The dairy farmers made a number of visits to the bank for getting the bank loan. The average number of visits was 13.5 with standard deviation of 2.12. The type of procedure that was required to be observed was the greatest stumbling block in contracting loan from commercial banks and this problem was reported by most of dairy farmers. The formal procedure to be observed in availing loan was found to be time consuming. Increased quantum of loan amount and reduced rate of interest on loan were the two most important suggestions for improving dairy animal loaning operations of the banks.

A major problem confronting the farmers desirous of availing bank loans is their lack of awareness about various schemes available with the banks. Procedures and processes, which have already been simplified to a great extent by the banks, could not yield the desired results on account of low awareness levels of the farmers. It has been observed that at places, where awareness levels are high, farmers have less complaint about the extant procedures and processes. The lack of awareness often makes the farmers shy of approaching the banks directly. Therefore, it is recommended that a concerted and coordinated effort on the part of the banks is needed to spread awareness among the rural population as a whole and the dairy farmers in particular. A certain amount of hand-holding may actually make the task easier for the banks. Therefore, the banks may actively encourage formation of "Farmers' Clubs", which can act as focal points for dissemination of information. An informal credit delivery system through Self Help Groups (SHGs) may also help individual borrowers, who are wary of approaching the banks for loans**.** The bank-SHG linkage programme needs to be expanded further for this purpose.

The banks should actively consider opening of counseling centers, either individually or with pooled resources, for credit and technological counseling. This will make the farmers aware of their rights and responsibilities to a great extent. The bank branches should also display as much information as possible for the benefit of the farmers. The counseling centers should have the facility of on-line submission of applications, which may be forwarded to the branches.

The banks under the aegis of Lead Banks should hold 'awareness melas' in district**s** where agriculture related issues including improved dairy practices, lending schemes of various banks etc. could be discussed extensively. The concerned extension officers/development officers of the local government should also be involved in the process.

The small and marginal farmers approaching the banks for loans are often apprehensive about the urbane nature of the bank personnel. This leads them to the clutches of the money lenders. In order to reverse this, the farmers need to be encouraged to approach banks for credit. The Agricultural Officers and Rural Development Officers in the rural branches can play an active role in this regard. It

has been observed that dispensation of rural credit requires more time and effort particularly in dealing with the small and marginal farmers, who are often not well informed. Therefore, the rural branches need to be adequately staffed. It has been further observed that mostly the staff posted at rural branches do not stay locally and therefore are unable to have intensive interaction with the farmers and bond with them. The rural officers of the banks should act as friend-philosopher and guide to the farmers. In this backdrop, proper sensitization of staff at the rural branches is a major issue that requires attention.

4.4.6 Constraints faced in getting bank loan

It is obvious that the insurance policy was purchased mostly by the farmers who had taken bank loan for the purchase of animals. So, the purchase of insurance was highly linked with the availability of bank loan for the purchase of animals. Table 51 shows that the main problem in getting bank loan was illieteracy problem. The other problems were lack of knowledge among dairy farmers about the rules and regulation, long formality of loan procedure and distance from bank. About seventy six per cent respondents reported that the main problem was the illiteracy. They found that the rule and regulation of getting bank loan was quite challenging. About 58 per cent respondents claimed that there was a long formality in bank loan procedure. Some of the respondents also reported that distance of the bank was also one of the major constraints in bank loan.

Table 51: Distribution of respondents according to different constraints faced in getting bank loan (N=62)

Sl.No.	Constraints	No. of respondents	percent	Rank
1.	Literacy problem / Illiteracy	47	75.8	1
2.	Doesn't know rule and regulation	41	66.1	2
3.	Long formality	36	58.1	3
4.	Distance of bank	24	38.7	4

As livestock production is vulnerable to widespread damage from various risks, the farmers are unable to repay their borrowings. The perception of bankers is

that the financing of livestock activities is a risky proposition and many loans are likely to become bad. Consequently this sector does not receive credit for production activities. No short-term credit normally is given for meeting the recurring expenditure of milch cattle, buffalo, sheep or goat units. It is desirable to provide some short term credit not exceeding cost of feed for one month, so that the farmers' liquidity position is not affected adversely immediately on investment (Planning Commission, 2007).

4.4.7 Problems faced in claim settlement

Dairy farmers faced different types of problems in claim settlement. Dairy farmers were asked to rank the different problems according to their importance such as literacy problem / Illiteracy, distance of insurance agency, delay in visit of insurance agent, doesn't know the rule and regulation, long formality and delay in payment. Table 52 presents the magnitude of different problems faced in settlement of the claim. About 79 per cent of insurers did not know the rules and regulations for claim settlement. In the ranking of problems, it got the first place. Literacy problem / Illiteracy was another major problem. Generally, dairy farmers were not much educated or even literate. The other constraint was long formality in settling the claim which got 3rd rank. Delay in payment and visit of insurance agent and veterinarian were the other constraints ranked 4th and 5th ranks, respectively. Around twenty two per cent of respondents also claimed that distance to insurance agency was a major constraint in claim settlement.

Table 52: Distribution of respondents according to different constraints faced in claim settlement (N=72)

Sl.No.	Constraints	No. of respondents	percent	Rank
1.	Literacy problem / Illiteracy	41	56.94	2
2.	Doesn't know rule	57	79.17	1
3.	Long formality	38	52.78	3
4.	Distance of insurance agency	16	22.22	6
5.	Delay in visit of insurance agent	25	34.72	5
6.	Delay in payment	33	45.83	4

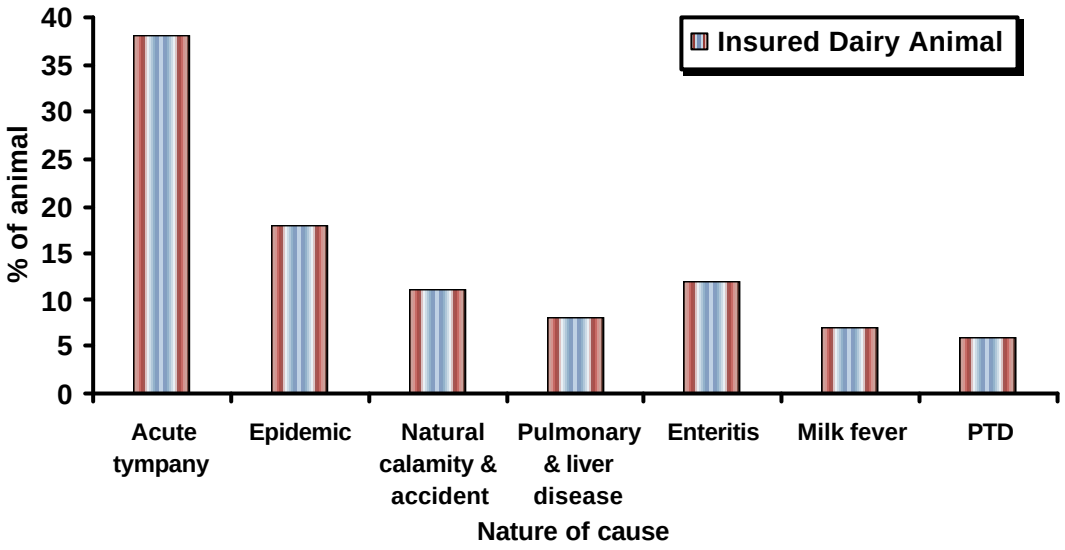


Fig. 4.17 : Causes of insurance claim

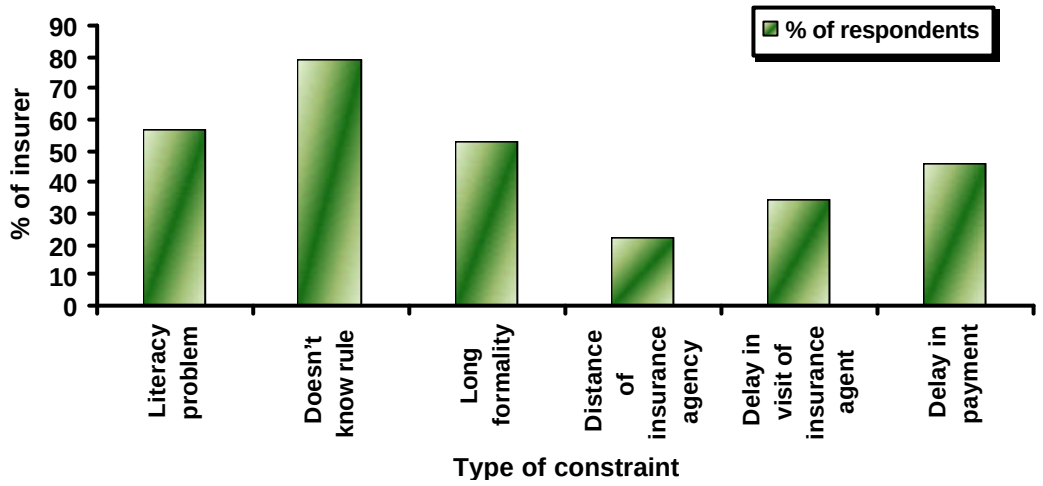
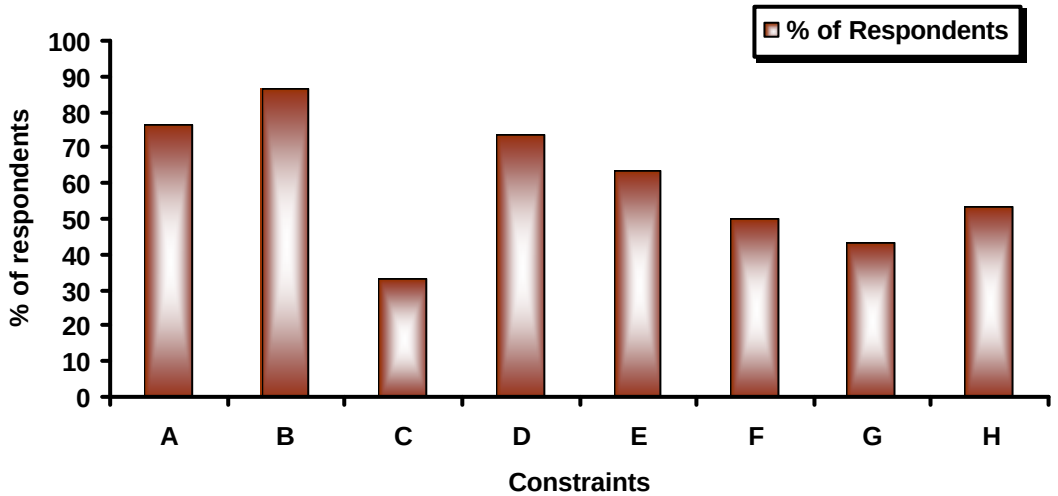


Fig. 4.18 : Constraints faced by dairy farmers' in cattle and buffalo



A : Lack of full proof system of identification; B : Lack of asses to correct value of animal at the time of Insurance and claim; C : Fraud by people; D : Illiteracy of livestock farmers; E : Staff problem to attend claim; F : Long distance of insurer; G : Not timely information about death of animal; H: Insurers doesn't follow the rule and regulation

Fig. 4.19 : Constraints faced by insurance agency in cattle and buffalo insurance

4.4.8 Problem faced by insurance agencies

Insurance agents (30) from different companies were asked for constraints which they faced during cattle and buffalo insurance. The constraint which was reported by the highest proportion (87 per cent) of the agents was lack of assessment by respondents about the correct value of animal at the time of insurance and claim was the main constraint in insurance. Lack of full proof system of identification was also one of the major constraints faced by insurance agencies as reported by 77 per cent of respondents. The identification system of animal was button type ear tag which had some drawbacks, such as falling of tag during grazing, fading of number on the tag and falsification by changing the tag to other animals. Fraud claim cases made by owners by changing the tag to other dairy animals also constitute a major constraint by the insurance agencies. Some time they cut the tagged ear of animal for claim after cremation of dead cattle and buffalo.

Table 53: Distribution of insurance agents according constraints faced in livestock insurance (N=30)

Sl.No.	Constraints	No. of respondents	percent	Rank
1.	Lack of full proof system of identification	23	76.67	2
2.	Lack of estimation of correct value of animal at the time of Insurance and claim	26	86.67	1
3.	Fraud by people	10	33.33	8
4.	Illiteracy of livestock farmers	22	73.33	3
5.	Staff problem to attend claim	19	63.33	4
6.	Long distance of insurer	15	50.00	6
7.	Not timely information about death of animal	13	43.33	7
8.	Insurers doesn't follow the rule and regulation	16	53.33	5

Illiteracy was also a constraint faced by insurance agents because of which most dairy farmers were unable to fill the form for insurance as well as for claim. Insurance companies also faced the problem like shortage of staff to attend the cases of dairy farmers who were spread over a large area. About 53 per cent respondents reported that the dairy farmers do not follow the rules and regulations of livestock insurance. Insurers did not inform timely about the death of insured animal. Some agents also reported that people were involved in fraud cases of insurance.

4.5 SUGGESTIONS TO IMPROVE DAIRY ANIMAL INSURANCE

Based on this study and available letrature an attempt has been made to identify the issues and discuss different methods to improve the cattle and buffalo insurance among dairy farmers and their policy implications.

4.5.1 Identification of insured cattle and buffalo

Identification of cattle and buffaloes was done by the ear tagging which had some drawbacks like fading of tag number, falling of tag, falsification of insured cases etc. Therefore, it is recommended that identification of animals should be done by full proof method. By the following means the above problem could be tackled.

- Un-removable ear tag
- RFID (Radio Frequency Identification System), External and internal
- Double tagging
  - Both ears conventional ear tag
  - One ear conventional and other RFID
  - Un-removable ear tags at both ears
- DNA finger printing
- Retinal and cephalic index
- Muzzle identification

The State Government of Gujarat has already implanted about 1.5 lakh RFID chips in cattle and buffaloes to prevent fraudulent applications for loans or claims against cattle insurance policies. The District Rural Development Agency (DRDA) in Gujarat would be permanently injecting microchips in the cavity behind the ear

of cows and buffaloes. The microchip is based on WORM (write once and read many) technology making it tamper resistant and giving a unique 15-digit identification number for the cattle sporting it. The tags are compatible with the tissues of the cattle. They are ISO compliant and do not have any negative effect on the cattle. The backend software support for the chips is also being created. It will host all the data on the cattle including milk yield, hereditary diseases, insemination and pedigree (Business Line, 2007).

4.5.2 Extended risk coverage

There are no innovations in extending coverage (e.g. for infertility) and risk covered. Insurance products presently offered are limited to catastrophic death and disability covers. The insurance companies mostly provide such coverage for animals, except for large and organized units. The coverage of insurance should be extended to small units and cases such as partial disability like reduced milk yield due to mastitis or Foot and Mouth Disease or other major diseases which are not covered in the present insurance policy.

For analyzing the losses due to epidemic disease spread, the compensation can be classified into following two categories: compensation for direct losses and compensation for consequential losses (Van Asseldonk *et al,* 2003). Direct losses include the value of the animal destroyed, welfare control measures and organizational aspects. If compensation schemes for these losses exist, these are funded either from national budgets or from co-financed public-private schemes where farmers pay a compulsory or voluntary levy to a separate fund. Consequential losses include business interruption, additional repopulation costs, and losses from emergency vaccination and price effects. If they do exist, compensation schemes include private insurance schemes, free public disaster assistance, where, or from public-private partnerships, where the government may act as an insurer or re-insurer.

4.5.3 Risk classification

Farmers perceive that the risks they take themselves are less serious than those taken by other farmers. This may be relevant for insurers. Such perceptions

may reduce farmers' interest in insurance schemes since farmers may have the feeling that they are paying for the risks taken by others. Risk classification and premium differentiation based on objective and transparent measures of risk may reduce such problems. Due to absence of historical data and no actuarial fair pricing**,** the rate of premium is not calculated properly so that there should be proper recording of data and calculation of fair pricing of animal. An insurer must be able to accurately classify potential policyholders according to their risk exposure. Those faced with higher (lower) risk exposure will be charged higher (lower) premium rates. If insurers do not have sufficient information to conduct accurate risk classification, adverse selection problems will occur. This is particularly true if potential policyholders have better information about their risk exposure than the insurer. Those who have been misclassified to their benefit (charged premium rate that are too low) will be more likely to purchase insurance, while those who have been misclassified to their detriment (charged premium rate that are too high) will be less likely to purchase insurance.. The result will be higher than anticipated indemnities. The insurer, not understanding this was caused by an underlying classification problem, will simply raise premium rates.

4.5.4 Monitoring system

The monitoring system of insurance companies was not up to the mark and it should maintain a sound data base at the level of divisional office. Monitoring system can be made more effective by recruiting staff from insurance background. Data on the clinical and production performance of the insured stock should be maintained every year which helps in insurance claim and insurance of that animal next time. The data pertaining to number and type**s** of animals insured, identification method, age of animal, claims made, claim settled etc. should be maintained species-wise and scheme-wise. Such a data system should help arriving at mortality rates of different species of animals which in turn is essential in rationalizing the premium rates and in designing the support services (Prasad and Rao, 1992b).

4.5.5 Determinable and measurable loss

Determination of how much loss occurred is one of the major problems in livestock insurance. If a loss has occurred, can one clearly determine whether or not the loss was caused by an insured peril? Can the magnitude of loss be accurately measured? If the answer to any of the above question is 'no', then it will be very difficult to conduct loss adjustment on insurance claims. Frequent disagreement between the insurer and policy holders will lead to litigation regarding whether an indemnity is due to or the magnitude of the indemnity. An important insurance principle is "one can't insure what can't be measured" (Shaik *et. al.* 2008). There should be a valid technique to measure the exact loss.

4.5.6 Subsidized premium rate

The demand for livestock insurance is extremely price elastic which means any attempt to increase the livestock insurance premium rate rapidly brings drown the number of animals insured. By subsidizing the insurance operation to activate the supply side and take advantage of high price elasticity of demand, increase in coverage and penetration of insurance can be achieved. Then the policy of de-subsidizing the premium rates gradually can be adopted. It is expected, that due to genetic up-gradation, the average value of animals is likely to increase at least 3 times by the year 2010. That also means that income derived from the improved breeds, will increase commensurately and bring down the price elasticity of demand, among other things. The time will then be appropriate, to begin desubsidising premium rates.

4.5.7 Exemption from service tax

Cattle and buffalo policies are primarily designed for the dairy farming community, who bear the maximum burden of risk. The financial health of dairy farmers is an open secret. It is prudent to make this burden as light as possible. Exemption of service tax could act as a breather in this reality (Prasad and Rao, 1992a).

4.5.8 Reduce time period of claim settlement

The existing claim settlement time period quite long. There is thus a need to decrease the time period of claim settlement and streamlining the process of settlement. The process of claim settlement has different steps and by lowering the time period of claim settlement process, such as honoring the death certificate from local officials and not insisting on a veterinarian certificate, insurance companies can achieve the claim settlement within the proposed time period. In case of natural calamities there should be the provision that claims should be settled down on the spot and fortnightly or monthly basis in other cases (Prasad and Rao, 1992b). The time periods for other administrative processes should be cut down to lower levels.

4.5.9 Refund on no claim

There should be some incentives in terms of refund of some amount of premium to the livestock farmers on no claim bonus within the specified period. This type of incentive will encourage the livestock farmers to participate in insurance scheme.

4.5.10 Awareness programme about Livestock Insurance

Livestock insurance has low penetration (less than 10 per cent of cattle and buffaloes insured) due to slim coverage, problems with distribution channels, literacy and awareness. Few state governments have launched schemes for the benefit of certain sectors such as Avikavach of Rajasthan for the benefit of sheep flock owners. Such schemes though have laudable objectives are not implemented effectively, mainly due to lack of awareness among the beneficiaries. There should be awareness programme from different departments to increase the knowledge of the livestock farmers about the livestock insurance. Most of the livestock farmers are not aware of insurance, which warrants a mass awareness programme by the concerned department. It is important that the farmers are made aware of the benefits of such schemes so that the owners will be inclined to pay the required premium to insure them. Knowledge should be extended to dairy farmers about standardized risk reducing practices of livestock farming.

Fig. 4.20 : Female dairy farmer showing ear tag as mark of identification

Fig. 4.21 : Awareness programme of National Livestock Insurance Scheme by State Department of Animal Husbandry

4.5.11 Establishment of cattle insurance corporation

India ranks first in milk production and dairy farming has evolved as a lucrative business all over the country. There is need of a full-fledged separate corporate body dealing exclusively in animal insurance. The corporation will play a catalytic role to promote and deliver integrated risk management services to livestock farming community. A part from NLIS, a large number of animals should be insured under other government schemes. By improving the network of operation and by offering more attractive terms, the coverage of livestock insurance can be further improved.

4.5.12 Policy implications

Lack of access to formal coping mechanism such as protective cover through insurance becomes a critical gap for the poor to face the risk. At present, the numbers of animal insured are very low, in spite of a large population of productive cattle and buffaloes. The report of the task force set up to suggest measure**s** to improve coverage of animals under cattle insurance also indicates that the present coverage is abysmally low for both scheme and non-scheme animals. The reasons observed are several that include lack of awareness, literacy problem, affordability, lack of delivery channels that provide access at the doorsteps, problem in claims settlements etc. from the view points of livestock holders and high cost of transaction and service from the view points of the insurance industry.

The need of the hour for policy makers and insurers is to design programmes for better education of the dairy farmers so that they can assess risk management tools and thereby increase their participation in insurance. The low level of education of many dairy farmers in the study area had negatively influenced the decision to purchase livestock insurance. Government should intensify its advertising efforts and inform dairy farmers about their insurance products, taking into account the farmers' education level. Dairy farmers from lower social status usually have a lower probability of participating in insurance implying the need to target these dairy farmers. Results suggested that old and experienced farmers have a greater

probability of adopting insurance. Skees (1999) reported that subsidized insurance programmes favour those with highest risk and those in the highest risk regions. Therefore, a variable premium, as in all insurance schemes, is recommended. Despite government claims that it offers subsidized premiums, some dairy farmers were feeling that the premium payments are still too high. Therefore, further lowering of premiums could motivate dairy farmers to adopt insurance.

Lastly, it is highly recommended that a thorough study should be conducted and workshops should be held that involve all stakeholders (farmers, Ministry of Agriculture staff, bankers, veterinarians, researchers, insurance companies) before additional insurance products are launched. A formal cattle and buffalo insurance scheme should be established in order to urgently manage cattle disease risks. There is also need for economic empowerment of both male and female farmers to improve their WTP and adoption of the scheme. Sustainability of the scheme should be ensured by educating farmers to integrate its operation within their livelihood objectives and cultural norms.

5 Summary and Conclusions

This chapter describes the summary, conclusion, policy implication of the study and future areas of research. The present study entitled "An appraisal of Cattle and Buffalo Insurance among Dairy Farmers in Uttar Pradesh" was carried out to know the risks associated with cattle and buffalo rearing and ascertain situation in reference to cattle and buffalo insurance among dairy farmers in Uttar Pradesh. This study also analyzed the farmers' willingness to pay for dairy animal insurance and factors which influenced the livestock owners' willingness to pay. The study had the following specific objectives.

OBJECTIVES

1. To identify the sources of risks perceived by the dairy farmers.
2. To analyze farmers' willingness to pay for cattle and buffalo insurance.
3. To identify the existing problems in dairy animal insurance and suggest ways and means to improve it.

Out of the 70 districts of U.P., National Livestock Insurance Scheme was functional in 12 districts. From these 12 districts, Gorakhpur District was selected randomly for this study. Two groups of the cattle and buffalo owners were selected, one group who had insured at least one cattle or buffalo from their herd and the other group who never insured their dairy animals. A total of 120 respondents were selected for each group i.e. non insured and insured. The ultimate sample, therefore, comprised of 240 cattle and buffalo owners. To ascertain the different constraints

faced by insurance companies, 30 respondents i.e. agents of different insurance companies were also selected randomly. Apart from primary data collected from the respondents, information from the other sources such as official records, discussion with different officials of banks, veterinarians, insurance companies, etc were also used for this study.

A semi-structured interview schedule was developed keeping in mind the objectives of the study and for measurement of different variables. The schedule was pre tested and modified according to the comments and suggestions of the farmers. The schedule was finally administered for collection of data from the selected respondents through personally interviewing them and organizing Focus Group Discussions (FGDs). Suitable statistical techniques were used to analyze and interpret the data. The major findings of the study are highlighted as follows:

1. The composition of dairy farmers showed that 70 per cent respondents belonged to middle age group i.e. 30 to 50 years, 17.5 per cent to old age group and only 12 per cent to young age group. The mean age and standard deviation were 40.7 and 8.0 for non-insured and 42 and 9.5 for insured dairy animal owners, respectively.

2. Among non-insured respondents, 71 per cent were male and 29 per cent were female, whereas, 67 and 33 per cent of respondents in insured category were male and female, respectively. It clearly shows that percentage of female respondents was more in insured group than that in non insured category.

3. The level of education among both the group of dairy farmers was equal. There were nearly equal number of respondents who were illiterate had primary school and middle school education. Proportion of illiterate respondents was more in insured category than the non insured category.

4. In non-insured group of dairy farmers, 82.5 and 17.5 per cent respondents were from Hindu and Muslim community, respectively. Eighty five and 15 per cent insured dairy animal owners belonged to Hindu and Muslim community, respectively. Other backward class and general category respondents were more in insured group than the non-insured group.

5. The main occupation of the dairy farmers was mostly agriculture. Private job holders were more (17 per cent) in insured than among the non-insured respondents (10 per cent). Only 4 per cent from non-insured category and 6 per cent from insured category respondents were in government job. Overall, 13 per cent respondents were in private job and 5 per cent were engaged in government jobs.

6. The land holding was higher for the dairy farmers who insured their animals than the non-insured dairy farmers. The number of large land holders was more among insured respondent than the non-insured respondents.

7. All the respondents were in contact with the bank, whereas, 80, 55 and 62 per cent respondents were in contact with the animal husbandry department, agriculture department and insurance agency, respectively. Insured respondents were more in contact with the extension agencies than the non insured respondents.

8. The average dairy farming experience for non-insured respondents was 12 years, whereas, 14 years of experience was among insured respondents. It was clearly indicated that average dairy farming experience of insured respondents was more than that of non-insured respondents.

9. Around 64 and 41 per cent non-insured and insured dairy animal respondents, respectively had indigenous cows in their herd. Generally, both the group had less than 4 indigenous cows. Around 71 per cent respondents who had indigenous dairy cows claimed 2-3 liter milk /day/animal. The annual milk production from each indigenous animal was 900 – 1200 liter reported by 59 per cent respondents from both group (i.e. non-insured and insured dairy animal owners). None of the insured dairy animal respondents claimed more than 1200 liter milk/ animal/annum.

10. Around 53 per cent and 37 per cent non-insured and insured respondents, respectively, had crossbred cows. Nearly equal percentage of dairy farmers from non insured and insured group had 2-3 crossbred cows. More than 3

crossbred cows owned by insured dairy animal respondents were high than the non-insured respondents. Around 68 per cent insured and 55.5 per cent non-insured respondents reported 7-9 liter of milk production per day from each crossbred animal. The total annual 2100-2500 liter of milk production per annum per crossbred cow was reported by 57 and 48 per cent non-insured and insured respondents, respectively.

11. Nearly equal percentage of respondents (88%) from non-insured and insured groups had buffalo as a main dairy animal in their herd. The percentage of respondents, who had more than 8 buffaloes was quite high in insured groups than the non-insured group. Nearly 50 per cent respondents of both category reported 5 to 6 liter of milk production per day per buffalo. The annual 1400 to 1800 liter milk production from buffaloes was reported by 60 and 55 per cent non-insured and insured respondents, respectively. The annual milk production was high in insured group than the non-insured group. Overall, 57 per cent respondents claimed 1400 to 1800 liter milk production/animal/ annum, whereas, 17 and 26 per cent respondents reported more than 1800 liter and less than 1400 liter milk production per year per buffalo.

12. The average milk selling price for both non-insured and insured respondents was Rs 18.78 per liter.

13. The average income from the dairying by non-insured and insured dairy animal owners was Rs 28041 and Rs. 26950, respectively. Nearly half of the respondents of non-insured and one fourth insured dairy animal owners reported Rs 21000 to Rs 40000 income from dairy farming.

14. The non insured respondents reported that the average vulnerability of indigenous cow per year was 1.25, whereas, it was 1.6 (average) for insured dairy animals. The average vulnerability of crossbred animal for non-insured cows was 2.3, whereas, this was 3.2 times/year for insured crossbred cow. The average vulnerability of buffalo for non-insured and insured group was 1.64 and 1.82 times/year, respectively.

15. The insured and non-insured respondents reported that the average treatment cost per dairy animal per year was Rs 1394 and Rs 940, respectively.

16. Epidemic livestock diseases, family health concerns, climate risk, marketing / sales risk, feed cost variability, poor conception and delay in treatment / AI were relevant sources of risk to the dairy farmers. Consumer preferences, changes of agricultural policy, environment policy, burglary/ theft etc, animal welfare policy, elimination of government support and changes in farm capital were less relevant sources of risk than the other sources of risk. Sources of risk like variability in milk price, crop yield variability, changes in production technology and anoestrus were most relevant with high level of consensus among the dairy farmers.

17. The most relevant risk management strategy for the dairy farmers were vaccination of animals, having own agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. The dairy farmers' perceived that price contract for input, labour force, stock of adequate material, leasing or renting machinery and shared equipment partnership were not the relevant risk management strategies.

18. Most of the dairy animal farmers rank certain and stable income, inherited business, produce high quality food, to maximize profit and time for family living and concern for children among their top five goals.

19. The causes of insurance claim of dairy farmers were acute tympany, epidemic diseases, enteritis, natural calamity and accident, pulmonary and liver diseases, milk fever and permanent total disability.

20. The mean time taken to settle the claim for loanees and non-loanees was 105 and 77 days, respectively. The maximum time taken in settlement of claim was in dispatch of cheque, processing by the bank and certification by veterinarian.

21. The dairy farmers made a number of visits to the bank for getting the bank loan. The type of procedure to be observed was the greatest stumbling block

in contracting loan from commercial banks and this problem was reported by most of the dairy farmers. The formal procedure to be observed in availing bank loan was found to be time consuming. Quantum of loan amount to be increased and rate of interest on loan to be reduced were the two most important suggestions for improving dairy animal loaning operations of the banks.

22. Nearly 80 per cent non-insured respondents were willing to participate in livestock insurance scheme, whereas, 17 per cent respondents were not willing to purchase the insurance ticket due to different reasons. Only 4 per cent dairy farmers were undeisded about their stand on participation in insurance scheme.

23. The main problem in getting bank loan was literacy problem/illiteracy. Dairy farmers did not know the rule and regulations, long formality of loan procedure and distance of bank were the other problems in getting bank loan.

24. Dairy farmers faced different types of problems in claim settlement. literacy problem/illiteracy, distance of insurance agency, delay in visit of insurance agent, does not know the rule and regulation, long formality and delay in payment were the main constraints of dairy farmers in insurance claim settlement.

25. Insurance agencies were also faced with different constrain in cattle and buffalo insurance. These constraints were lack of estimation of correct value of animal at the time of insurance and claim, lack of full proof system of identification, illiteracy of dairy farmers, shortage of insurance agents to attend the cases of insurance and dairy farmers not following the rule and regulations of livestock insurance.

CONCLUSIONS

1. The livestock insurance scheme should target the young generation. These days when farming is not a lucrative business, government should come up with new schemes in the field of livestock insurance so that farming community will take dairying not as a risky enterprise.

2. The low level of education of many dairy farmers have negatively influenced the decision to purchase livestock insurance. Government should intensify its advertising efforts and inform dairy farmers about their insurance products, taking into account the farmers' education level.

3. Epidemic livestock diseases, marketing/sale risk and poor conception were perceived as significant sources of risks by the farmers. The present coverage of cattle and buffalo insurance is abysmally low for both scheme and non-scheme animals. The reasons observed are several that include lack of awareness, illiteracy, affordability, lack of delivery channels that provide access at the doorsteps, problem in claims settlements etc.

4. Most of the livestock farmers are not aware of insurance, which warrants a mass awareness programme by the concerned department. Farmers were ready to spend more money on the crossbred cows because they know that these animals were high value and more vulnerable to different risks.

5. The insurance coverage was low due to a number of factors, such as a lack of information on, or awareness of, the insurance scheme, a low level of education among farmers, poor rural infrastructure, affordability, degree of farmers' risk aversion, other subsidiary occupation and diversification of farm enterprises.

IMPLICATIONS OF THE STUDY

1. The identification system of animal was button type ear tag which had some drawbacks, therefore it is recommended that identification of animal should be done by full proof method.

2. The coverage of insurance should be extended to small units and cases such as partial disability like reduced milk yield due to mastitis or foot and mouth disease.

3. There should be awareness programmes from different departments to increase the knowledge of the livestock farmers about the livestock insurance.

4. Knowledge should be extended to dairy farmers about standardized risk reducing practices of livestock farming.

SUGGESTED AREA FOR FUTURE RESEARCH

1. The present study was confined to only one district in Uttar Pradesh. The study needs to be replicated on larger samples covering all the major districts regarding livestock insurance, so that the inferences drawn can be generalized to a greater extent.

2. The study about feasibility of livestock insurance programme may be conducted for other small animals as well as to determine risks, evaluating nature of risk, develop insurance coverage and willingness to pay for insurance.

3. An exploratory study can be undertaken to design livestock insurance product to cover systemic risk, epidemic risk, production risk, marketing risk etc. with non government subsidy for different livestock species.

6 Mini Abstract

The livestock activities are inherently risky and include animal mortality and morbidity due to infectious livestock diseases and changing output prices. Farmers are the most direct and primary victims who face the consequences of livestock risks. In order to cope with different risks, farmers have developed number of risk management strategies. Livestock insurance is a mechanism to protect farmers against the uncertainties beyond farmers' control. Insurance is probably the most common market based risk management instrument. Scant research attention has been given in ascertaining the impact that the insurance schemes have had till date, the existing and potential constraints in livestock insurance and how to design livestock insurance products based upon inputs regarding farmers' perceptions and needs so as to ensure their success. The present study, "An Appraisal of Cattle and Buffalo Insurance among Dairy Farmers in Uttar Pradesh" was planned to know the sources of risks perceived by the dairy farmers, their willingness to pay for cattle and buffalo insurance and also identify the existing problems in dairy animal insurance and suggest ways and means to improve it. Out of the 70 districts in Uttar Pradesh, National Livestock Insurance Scheme was functional in 12 districts and from these twelve districts, one district i.e. Gorakhpur was selected randomly for this study. Two groups of the cattle and buffalo owners were selected; one group who had insured cattle or buffalo from their herd and the other group who never insured their dairy animals. A total of 120 respondents were selected for each group i.e. non insured and insured. The ultimate sample therefore comprised of 240 cattle and buffalo owners. To ascertain the different constraints faced by insurance companies, 30 respondents i.e. agents of different insurance companies were selected randomly. The mean age was lower for non-insured than the insured respondents. The level of education among both the group of dairy farmers was equal. The land holding was higher for the dairy farmers who insured their animals than the non-insured dairy farmers. The average dairy farming experience for non-insured respondents as 11.6 years, whereas, 14 years of experience among insured respondents. The annual milk production by indigenous cow from each animal was 900 – 1200 liter reported by most of the respondents from both group. The average milk selling price for both non-insured and insured category of respondents as Rs 18.78 per liter. The non insured respondents reported that the average vulnerability of indigenous cow per year was 1.25, whereas, it was 1.6 (average) for insured dairy animals. Epidemic livestock diseases, family health concerns, climate risk, marketing / sales risk, feed cost variability, poor conception and delay in treatment / AI were relevant sources of risk to the dairy farmers. The most relevant risk management strategy for the dairy farmers were vaccination of animals, having own agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. The causes of insurance claims were acute tympany, epidemic diseases, enteritis, natural calamity and accident, pulmonary and liver diseases, milk fever and permanent total disability. Nearly 80 per cent non-insured respondents were willing to participate in livestock insurance scheme, whereas, 17 per cent respondents were not willing to purchase the insurance ticket due to different reasons. The formal education of the farmers' and the farmers' awareness of livestock insurance, farming experience and use of alternative risk management strategies such as off-farm investments and farm enterprise diversification increased the probability of insurance adoption, whereas, poor location reduced the probability of livestock insurance adoption. The main problem in getting bank loan was illiteracy. Insurance agencies too faced different constrains in cattle and buffalo insurance such as lack of assessment of correct value of animal at the time of insurance and claim, lack of full proof system of identification, illiteracy of dairy farmers, shortage of insurance agents to attend the cases of insurance and dairy farmers do not follow the rule and regulations of livestock insurance.

7 लघु सारांश

पशुओं में संक्रामक बीमारियां व उनसे होने वाली मृत्यु एंव पशु उत्पादों के मूल्य में परिवर्तन पशुधन व्यवसाय को जोखिम भरा बनाता है। किसान पशु जोखिमों के परिणामों का सबसे अधिकप्रत्यक्ष और प्राथमिक शिकार होते हैं। किसान इन जोखिमों से निपटने के लिए विभिन्न प्रकार के जोखिम प्रबंधन रणनीतियों को अपनाते हैं। पशुधन बीमा के द्वारा किसान बाहरी अनिश्चित्ताओं से अपना बचाव कर सकते हैं। जोखिम प्रबंधन में बीमा सबसे अधिक प्रचलित माध्यम है किन्तु इससे जुड़ी मौजूदा और संभावित बाधाओं को दूर करने और किसानों के अवधारणा के अनुरूप पशुधन बीमा उत्पादों को डिजाइन करने में पशुधन बीमा का अध्ययन बहुत कम किया गया है । डेयरी किसानों की विभिन्न जोखिमों को जानने, उनकी पशुधन बीमा पर रूचि और डेयरी पशु बीमा में मौजूद समस्याओं का पता लगाने के लिए वर्तमान अध्ययन 'उत्तर प्रदेश में डेयरी किसानों के बीच गाय और भैंस के बीमा काएक मूंल्याकन' किया गया। उत्तर प्रदेश के 70 जिलो में से गोरखपुर जिले को इस अध्ययनके लिए चुना गया था। दो तरह के गाय और भैंस पालक उत्तरदाता चुने गये जिनमें 120 उत्तरदाताओं का एक समूह ऐसा था जिसने अपनी गायों और भैंसों का बीमा किया था तथा 120 उत्तरदाताओं के दूसरे समूह ने अपने पशुओं का बीमा नहीं कराया था। इस तरह से कुल 240 गायों और भैस मालिकों को इस अध्ययन के लिए चुना गया। बीमा कंपनियों को पशुधन बीमा में आ रही बाधाओं का पता लगाने के लिए 30 बीमा कम्पनी एंजेंटों को भी उत्तरदाता के रूप में चुना गया। बीमा न कराने वाले पशु मालिकों की औसत आयु बीमा कराने वालो से कम थी। दोनो समूह के डेयरी किसानों का शिक्षा स्तर समान था। बीमा कराने वाले किसानों के पास कृषि योग्य भूमि बीमा नहीं कराने वाले किसानों से अधिक थी। बीमा कराने वाले उतरदाताओं का डेयरी व्यवसाय का औसत अनुभव 14 वर्ष था जबकि यह औसत 11.6 वर्ष था जिन्होंने बीमा नहीं कराया था। दोनों समूहों ने बताया देशी गाय का औसत उत्पादन प्रतिवर्ष 900 से 1200 लीटर था। दूध का औसत मूल्य दोनों समूहों के लिए रू 18.78 प्रति लीटर था। गैर बीमा उत्तरदाताओं ने बताया कि देशी गाय वर्ष में औसतन 1.25 बार बीमार पड़ती थी जबकि यह 1.6 बार था जिन्होंने बीमा कराया था।

पशुओं की महामारी, परिवार के स्वास्थ्य की चिन्ता, जलवायु जोखिम, विपणन/बिक्री, चारे की लागत का बदलना, कम गर्भधान और उपचार में देरी/कृत्रिम गर्भधान डेयरी किसानों के प्रमुख जोखिम थे। इन जोखिमों से बचाव (प्रबन्धन) रणनितियों में मुख्य थे, पशुओं का टीकाकरण, अपनी कृषि भूमि, वित्तीय प्रबन्धन, जीवन बीमा, पशुधन बीमा और गैर कृषि रोजगार। अफारा, महामारी रोग, आत्रशोथ, प्राकृतिक ऑपदा, दुर्घटना, फेफड़े और लीवर रोग, बुखार और स्थायी विगलंगता, बीमा दावा के कारण थे। किसानों की औपचारिक शिक्षा और पशुधन बीमा के बारे में जागरूकता, खेती के अनुभव जौखिम प्रबन्धन रणनीति जैसे की गैर कृषि निवेश और कृषि विविधिकरण, किसानों में बीमा लेने की संभावना को बढ़ाता था, जबकि दूरदराज स्थान, वैकल्पिककिसानों के बीमा लेने की संभावना को कम करते थे। बैंक ऋण में किसानों की मूल समस्या निरक्षरता थी। बीमा और दावा के समय पशुओं का सही मूल्यांकन, पहचान का पुख्ता प्रमाण, डेयरी किसानों की निरक्षता, बीमा ऐजेंटो की कमी, डेयरी किसानों का पशु बीमा नियमों का पालन न करना इत्यादि पशु बीमा में बीमा ऐजन्सियों की मुख्य समस्यायें थी।

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Annexure-1

DIVISION OF EXTENSION EDUCATION
INDIAN VETERINARY RESEARCH INSTITUTE
IZATNAGAR, 243122

INTERVIEW SCHEDULE

Research Title: An appraisal of cattle and buffalo insurance among dairy farmers in Uttar Pradesh

Respondent No. : _____ Name of village: _____
Date of Interview : _____ Name of block : _____

Particulars about Dairy Farmer

1. Name:
2. Address:
3. Age:
4. Gender:
5. Religion and caste:
6. No. of dependents:
7. Main occupation:
8. Farm income:
9. Household income:
10. Land holding (ha):
11. Highest level of education:
12. Material possession:

Item	Yes or No

1. TV
2. Radio
3. Motorcycle
4. Telephone
5. Car
6. Other

13. Mass media exposure (hr/week):

14. Extension agency contact:

Agency	**Yes or No**
1. Agriculture	
2. Bank	
3. Animal husbandry department	
4. Insurance company	
5. NGO	
6. other agency	

Particulars about Dairying

1. Ownership:
2. Dairy farming experience (years):
3. Herd Size:

	Indigenous	Crossbred	Buffalo
Number of Animal			
Lit./animal/day			
Annual Lit./Animal			

4. Other Animals: _____

5. Price of milk:

6. Labour units (man-years):

7. Time spend (hr / day / labour):

8. Dairy equipments:

9. Cost of treatment / animal / year:

10. Vulnerability to disease risk (yearly): Yes or No

Desi		Crossbred		Exotic		Buffalo	
Male	Female	Male	Female	Male	Female	Male	Female

Perception of Sources of Risk

Statement	Response				
	1	2	3	4	5
1. Livestock diseases (epidemic)					
2. Variability in milk price					
3. Variability in milk yield					
4. Family health concerns					
5. Climate risk					
6. Marketing / sale					
7. Price variability of livestock products					
8. Cost of operating inputs					
9. Feed cost variability					
10. Forage yield uncertainty					
11. Crop yield variability					
12. Changes in production technology 13. Poor conception					
14. Silent heat					
15. Anoestrus					
16. Delay in treatment / AI					
17. Unavailability of veterinary doctor					
18. Lack of extension agency support					
19. Animal diseases (non-epidemic)					
20. Consumer preferences					
21. Changes of interests rate and ability to repay loans					
22. Changes of agricultural policy					
23. Property rights (enough own land and					

inheritance rights)				
24. Lack of labor force (in or out family)				
25. Environment policy 26. Burglary/ theft etc				
27. Injury, illness/death of farm operator				
28. Animal welfare policy				
29. Elimination of government support				
30. Changes in farm capital				

1=Irrelevant, 2=Somewhat Irrelevant, 3=Undecided, 4= Somewhat relevant and 5=Relevant

Risk Attitude of Dairy Farmers

Statements	SDA	DA	UD	A	SA
1. I try new method in dairy farming					
2. I do not involve in other business expect dairying					
3. I never vaccinate my animals					
4. I never consult for any one for dairying					
5. My animals are low producers					
6. My animals are not resistant to diseases					
7. I never have enough cash for bad situation					
8. Only I am interested in dairying from my family 9. I never do any future contract for my dairying					
10. I use modern equipments for dairying					
11. I take bank loan for expansion of dairying					
12. I do not start dairying with bank loan					
13. I do not produces milk with low cost					
14. I do not have any life insurance policy					
15. I have enough land for fodder production					
16. I never received any training for dairy enterprise					
17. I never treat my animals with veterinarians					
18. I am always ready to invest in crossbred					
19. I never invest for expansion of dairy business					
20. Other sources of income is not necessary for survival of my family					
21. I allow my animals for grazing					
22. I never practice hygienic measures for good quality of milk production					
23. My animals never get good bedding					
24. I never store feed and fodder for lean season					
25. I never give adequate concentrate and green fodder to pregnant and lactating animals					
26. I never supervise dairy production with documentation					

27. I never use or sell manure as fertilizer					
28. I never use readymade concentrate mixture for animals					
29. I never make hay and silage for animals					
30. I never use high quality of semen for AI					
31. I never take advise from Govt./ NGO/extension agency etc					
32. I never sold milk lower to production cost					
33. I demand high prize at scarcity period.					
34. I never use new technology for fodder production and fodder treatment.					
35. I never listen/see any dairy related programme on mass media					

SDA= Strong disagreement, DA= Disagreement, UD= Undecided, A= Agreement and SA= Strong agreement

Risk Management Strategies

Risk Management Strategies	Response				
	1	2	3	4	5
1. Carrying financial (cash) reserve					
2. Enterprises diversification					
3. Spreading sales of milk and milk products					
4. Off- farm employment					
5. Price contract for known buyers					
6. Price contract for input					
7. Livestock insurance					
8. Life insurance					
9. Crop insurance					
10. Own agricultural land					
11. Adequate production technology					
12. Production at lowest possible cost					
13. Consultancy services					
14. Labour force (quality and quantity)					
15. Stock of adequate material 16. Leasing or renting machinery					
17. Applying strict hygienic rule					
18. Prevent / reduce livestock diseases					
19. Cooperative marketing					
20. Keeping fixed cost low 21. Use of economic information and consultancy services					
22. Shared equipment partnership					

1=Irrelevant, 2=Somewhat Irrelevant, 3=Undecided, 4= Somewhat relevant and 5=Relevant

Dairy Farmers' Goal

Sl. No.	Farmers goal	Rank
1.	Certain and stable income	
2.	Produce high quality food	
3.	Inherited business	
4.	Time for family living, concerns for children	
5.	Improve the farm for next generation	
6.	Have possibility to some leisure	
7.	Reduce debt, become free of debt	
8.	Continue to be a dairy farmer	
9.	Maximize profit	
10.	Work with animals/crops	
11.	Social contacts	
12.	Higher private consumption	

Particulars about Insured Animals

1. Total number of insured animals:

- Indigenous cow_____
- Crossbred cow_____
- Buffalo_____

2. Total number of financed animals:

- Indigenous cow_____
- Crossbred cow_____
- Buffalo_____

3. Date of purchase of insured animals:
4. Total purchase price:
5. Total amount of loan (if taken):
6. Name of bank:
7. Date of application for loan:_____ Amount: _____
8. Date of receiving loan:_____ Amount:_____
9. Amount of subsidy, if any:
10. Date of insurance:
11. Cost of animal at the time of insurance:

12. Type of insurance:
13. Method of identification:
14. Amount of premium:
15. Other charges if any:
16. Name of Insurance Company:

Particulars about Claim Procedure

1. Cause of claim and type of animal:
2. If death then cause of death:
3. Date to inform insurance agency:
4. Date of visit of insurance agent:
5. Date of postmortem:
6. Other charges:
7. Cost of animal at the time of death:
8. Amount of claim:
9. Date of submission of claim:
10. Date of getting claim
11. Amount of claim received:

Problems Faced by Insurers and Insurance Agency:

Problem in Getting loan

1. No. of visit:
2. Time consumed:
3. Please tell me what constraints you perceived in taking bank loan

Sl.No.	Constraints	Yes/No	Rank
1.	Literacy problem		
2.	Doesn't know rule and regulation		
3.	Long formality		
4.	Distance of bank		

Any other_____

Problem Faced in setting the Claim:

1. Number of visit to insurance agency: For insurance _____For claim _____
2. Time spent on setting the claim:
3. Number of visit and time to contact veterinary doctor to setting claim:
4. Please tell me what constraints you perceived in setting claim

Sl. No.	Constraints	Yes/no	Rank
1.	Literacy problem		
2.	Doesn't know rule		
3.	Long formality		
4.	Distance of insurance agency		
5.	Delay in visit of insurance agent		
6.	Delay in payment		

Any other_____

Problems faced by Insurance Agency:

1. Please tell me what constraints you perceived in livestock insurance

Sl.No.	Constraints	Yes/No	Rank
1.	Lack of full proof system of identification		
2.	Lack of asses to correct value of animal at the time of Insurance and claim		
3.	Fraud by people		
4.	Illiteracy of livestock farmers		
5.	Staff problem to attend claim		
6.	Long distance of insurer		
7.	Not timely information about death of animal		
8.	Insurers doesn't follow the rule and regulation		

Any other:_____

Satisfaction with Different aspect of Livestock Insurance

Statement	Response				
	CUS	US	UD	S	CS
1. Coverage of risks					
2. Quality of insurance agents					
3. Livestock insurance premium					

4. Indemnity period					
5. Quality of loss estimation					
6. Quality of insurance procedure					

CUS = Completely unsatisfied, US=Unsatisfied, UD=Undecided, S=Satisfied and CS = Completely satisfied

Willingness to Pay for Livestock Insurance:

A Cattle and buffalo insurance scheme will compensate your full value of animals. Th scheme will sell membership tickets / animal / year at different prices for a maximum c 5 years.

1. Will you buy the membership ticket: Yes / No/ Can't decide

If no/can't decide, please tell why you not buy ticket

a. Desire to shift from risky livestock production system to *'less risky'* nor agricultural Small and Medium Enterprises (SMEs)
b. Don't have enough money
c. Insurance scheme is too costly
d. No need of insurance
e. Any other reason

2. How much you are willing to pay for per animal per year for this scheme:

Cow- Desi_____Cross_____

Buffalo _____ Bullock _____

3. Number of ticket, animal and breed
4. Number of year to purchase membership ticket
5. Would you like to increase herd strength?
6. Would you like to increase herd quality?
7. Which breed would you like to buy?
8. How much willing to spend money for next purchase of animal?

Present Rs_____ Next Rs._____.