

## CHAPTER - I

### RISK MAPPING AND ANALYSIS OF CATTLE INSURANCE PORTFOLIO FOR IMPROVING THE CATTLE INSURANCE PENETRATION IN INDIA

#### 1. INTRODUCTION

Livestock sector plays an important role in socio-economic development of our country and is an important source of income for the farmers and poor rural people. Livestock sector is one of the largest in our country as it has been projected that we likely to have around 40 Crores livestock by 2020. Indian is one among the countries in the world having very large cattle population. 56.7% of world's buffaloes and 12.5% of world's cows and bullocks are in India. The contribution from livestock sector to national GDP has increased from about Rs. 119333 Crore during 2004-05 to Rs. 917910 Crore during 2016-17<sup>1</sup>. Further, various measures initiated by the Government has led to increase in milk production significantly from 10.26 Crores tons during 2006-07 to 17.63 Crores tons during 2017-18 with an annual average growth rate of 6.62%<sup>2</sup>.

It is interesting to note that while the milk productivity and crossbred cow population has gone up in India, the total livestock population has decreased by about 3.33% (as per the census statistics of the year 2012). Further relevant details are given in Table-1.

**Table 1 Bovine Population in 2007 and 2012- Highlights**

- The total Bovine population (Cattle, Buffalo, Mithun and Yak) is 29.99 Crores numbers in 2012 which shows a decline of 1.57% over previous census.
- The total cattle population has come down to 19.09 crores (2012) from 19.9 Crores (2007), resulting into 4.10 % reduction in the growth.

<sup>1</sup> Central Statistical Office (CSO) Estimates, 2018-19.

<sup>2</sup> Annual Report 2018-19, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India

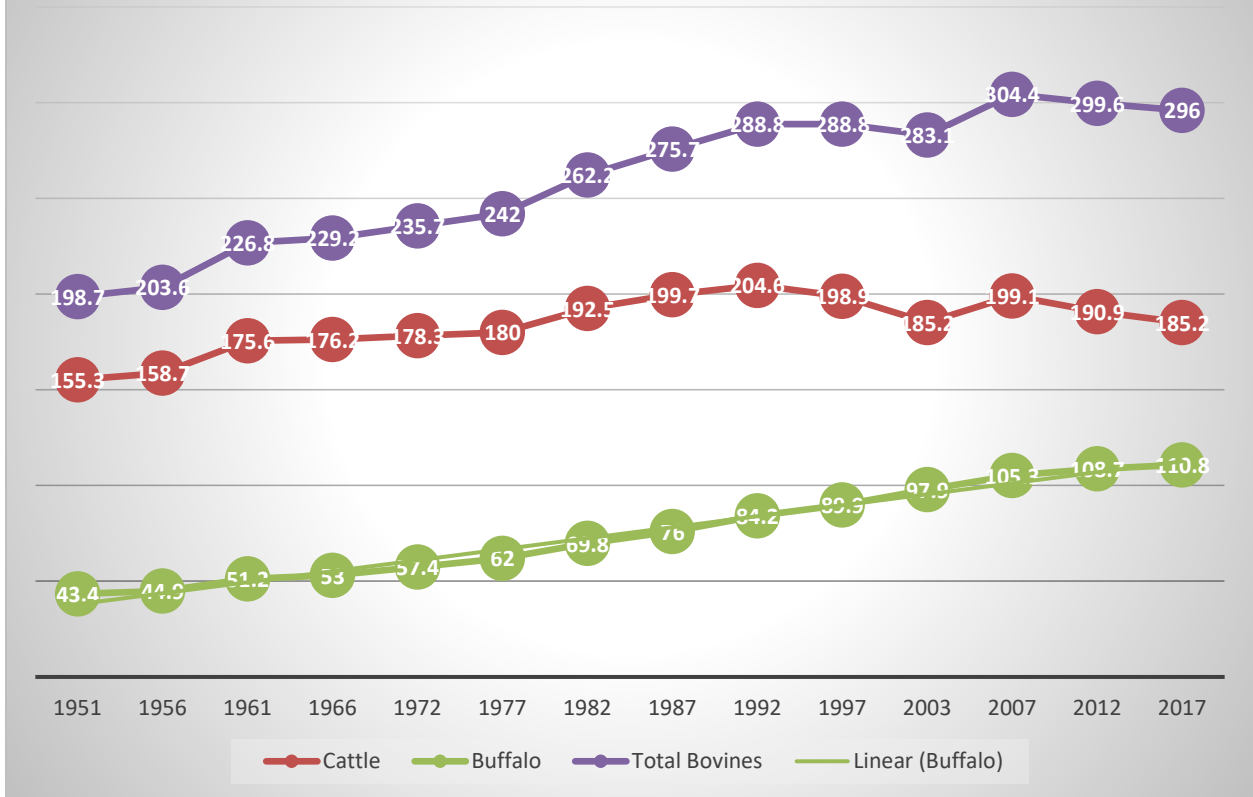
- The number of milch animals (in-milk and dry) in cows and buffaloes has increased from 11.11 Crores to 11.86 Crores, an increase of 6.75%.
- The number of animals in milk in cows and buffaloes has increased from 7.70 Crores to 8.05 Crores showing a growth of 4.51%.
- The Female Cattle (Cows) Population has increased by 6.52% over the previous census (2007) and the total number of female cattle in 2012 is 12.29 Crore numbers.
- The Female Buffalo population has increased by 7.99% over the previous census and the total number of female buffalo is 9.25 Crores numbers in 2012. The buffalo population has increased from 10.53 Crores to 10.87 Crores showing a growth of 3.19%.
- The exotic/crossbred milch cattle increased from 1.44 Crores to 1.94 Crores, giving rise to an increase of 34.78% whereas the indigenous milch cattle increased marginally from 4.80 Crores to 4.81 Crores, an increase of 0.17%.
- The milch buffaloes increased from 4.87 Crores to 5.1 Crores with an increase of 4.95% over previous census.

ALL INDIA LIVESTOCK CENSUS (in thousands)			
CATEGORY	2007	2012	% Change
<b>Cattle</b>			
❖ Exotic/Crossbred			
• Male	6,844	5,971	-12.75
• Female	26,216	33,760	28.78
❖ Total Exotic/Crossbred	33,060	39,732	20.18
❖ Indigenous			
• Male	76,779	61,949	-19.32
• Female	89,236	89,224	-0.01
❖ Total Indigenous	1,66,015	1,51,172	-8.94
<b>Total Cattle#</b>	1,99,075	1,90,904	-4.10
<b>Buffalo</b>			
• Male	19,597	16,103	-17.83
• Female	85,745	92,599	7.99
<b>Total Buffalo</b>	1,05,342	1,08,702	3.19

Source: 19 LIVESTOCK CENSUS-2012

**Figure 1: Historical Trend of Bovine Population in India**

## Historical Trend of Bovine Population in India



The above trend indicates a steady growth of bovine population as it is nearly 30 *Crores* now and would continue to grow. Hence, it is very important to ensure that this sector continuous to grow and contribute to our economy as it is one of the main livelihood for the farmers and rural people. Recent statistics indicates that livestock has become the second largest source of income for nearly 40 *Crores* of people in India. The success of livestock sector depends upon effective management of animal health with better rearing practices and higher productivity leading to better revenue for the farmers.

Livestock has been the main livelihood for many farmers or animal growers in India and if animal is lost; the entire family of the farmers suffers. Hence, livestock insurance plays vital role indemnifying the farmers or animal owners when their animal is lost, thereby protecting their livelihood.

## 2. NEED FOR CATTLE INSURANCE

6% of the cattle population of 30 Crores and less than 0.6% of the cattle owners in India only are insured (Planning Commission Report). General Insurance Corporation of India introduced the first cattle insurance scheme after nationalization of General Insurance Industry in 1972 for the purpose of building good cattle insurance portfolio and pioneered in cattle insurance market through its four subsidiary companies. But even after 4 decades, 6% of the cattle population and less than 0.6% of the cattle owners in India only are insured.

National Commission on Labour and the Social Security, India, stated that one of the key issues pertinent to the underdevelopment of the cattle insurance is that most of the policies or schemes are developed with a 'top-down' approach and therefore do not cater to the needs of the beneficiaries. The cattle insurance schemes in India are more supply-driven than demand driven/need based. This implies that the market is driven by a few producers who decide what the consumers need and how much they would pay for it and how they prefer to have it delivered. Market survey on cattle insurance revealed that the low demand for cattle insurance in spite of high potential is due to very little attention to product development and product diversification by insurers coupled with unsatisfactory delivery to the customer.

Though this kind of insurance is very essential, but neither the farmers come forward in taking this insurance nor the insurance companies interested mainly for the fact that the premium volume is quite low with high transactional cost. Further, the portfolio has higher incidence of claims, which makes the portfolio loss making, and the overall loss ratio of the portfolio is close to 90%. Such higher loss ratio is mainly due to rising incidences of moral hazard and adverse selection by the few customers who have better

knowledge about manipulating and misusing insurance in their favour by way of either adverse selection or lodging false or fraudulent claims with the insurance companies.

As a result, the average genuine customer pays higher rate of premium due to high loss ratio of the portfolio. Our interactions with the rural customers indicate that a majority of them do not come forward to insure their animals as they perceive that the premium rates are higher and they do not receive the claims in time due to delayed settlement by the insurers. Hence, it is important for the insurers to understand what contributes to adverse selection or moral hazard and identify the risk characteristics of the animals. This would also help the insurer to categorize the animals into High, Medium and Low risk segments in terms of their animal characteristics, quality of rearing, Feed quality, animal health management, etc., and map them with appropriate premium rates.

Many strategies were implemented to improve the penetration and spread of cattle insurance by public sector insurance companies as risk carriers. Cattle insurance was and is imposed as mandatory with bank credit for dairying activities. More than 90% of cattle insurance premium underwritten is through this model. Only the balance 10% of cattle insurance premium underwritten is procured through direct sale to customers who voluntarily take cattle insurance. Cattle insurance products were subsidized for most of the time through one or other government schemes leading to contrasting results. Though this strategy helped to underwrite good volumes of cattle insurance premium; it prevented development of multiple products to suit to the diverse needs of customers. This resulted in lack of steady growth of cattle insurance premiums in spite of the huge potential. This also led to a dis-incentive for setting up a proper database, which stalled the process of continuous up-gradation of cattle insurance products and premiums based on actuarial data analysis of mortality tables. As a result, insurers were

offering only one product in cattle insurance with very little choice to the customer to choose the product suited for his needs.

It is perceived that insurers opt for underwriting cattle insurance only to comply with the social and rural obligations stipulated by IRDA but not as part of underwriting philosophy approved by the boards of their company, even though it resulted in high underwriting losses owing to losses that may have been controllable. Both public as well as private insurers procured less than 1% total premium from cattle insurance. Cost of entering unorganized rural livestock markets is very high which is multiplied when combined with underutilization of available distribution channels resulting in very little underwriting of cattle insurance. Challenges are also faced by the insurers in the selection of risks due to lack of proper risk mitigation strategies in vogue. Lack of minimum infrastructure with the veterinarians and animal husbandry departments added to the woes of the insurers.

It is interesting to find that insurers have realized that claim ratio was not in control owing to the misuse in identification of cattle and also their valuation due to improper or no monitoring at the time of underwriting and/or at the death of cattle. It is important to note that in the present market scenario demand for cattle insurance also remains a big problem due to lack of awareness and willingness to pay the premium amounts, as also apprehension of the farmers of the attitude and services of the insurance companies.

Indian insurance market has become very competitive and difficult after the opening up of the sector and allowing private insurance companies to operate. Insurance market is confronted with unhealthy market practices, competitive pressures, severe under cutting of premium rates and frequent regulatory changes while the risk dynamics of

various portfolios remained highly volatile. Risk profile of Indian customers more particularly corporate customers is changing fast with the entry of multinational companies with new technologies and strategies, which poses numerous challenges to Indian companies, triggering new risk frontiers, increasing customer expectations / requirements, etc.

All these changes emphasize the need for targeting new portfolio/ segments with high potential through healthy competition. Cattle insurance is one of such fast growing portfolios in non-life insurance in terms of volume of business potential. This portfolio can contribute up to 20% of the total premium and can become profitable provided the portfolio is monitored properly to bring down the loss ratio to less than 70%. This segment has also been one of the potential segments with huge untapped potential available in semi urban and rural areas where competition is comparatively less. Realizing the above importance of this portfolio, the research paper is written with the following objectives;

### 3. OBJECTIVES OF THE STUDY

The main objective of the paper is given below:

- I. To study the dynamics of cattle insurance market and the latest trends and best practices of cattle insurance.*
- II. To examine the profile of risks associated with cattle and changing cattle management practices with a view to study the implications of innovative risk management practices on underwriting and claims management in cattle Insurance.*
- III. To understand the ever increasing customers' expectations and perceptions about cattle management practices and cattle insurance needs with a view to map the insurance products with the socio-economic profile of the farmers.*

- IV. *To offer suggestions to resolve the operational issues and the challenges of cattle insurance and improve cattle insurance penetration in India.*

## 4. METHODOLOGY ADOPTED FOR THE ANALYSIS

The main objective of this chapter is to identify the various types of risks that are affecting the cattle and develop risk profile of the animals considering their demographic characteristics, condition of shelters and rearing practices, Nutritional and Feed management, animal health care management, exposure to catastrophic risk hazards, etc. The primary purpose of this analysis is to categorize the animals in accordance with their risk profiles. The animals with higher market values (Rs.75000 to Rs.100000) with high risk characteristics (Exotic/Imported Animals) will be categorized as a high risk animals and similarly, the animals with average market values (Rs.50000) with low or moderate risk characteristics will be categorized as low or moderate risk category depending upon their risk exposures and characteristics.

Considering the nature and types of analysis required for the study, Cohort Analysis was carried out to analyze the insured animals risk characteristics for the last 5 years using historical data available from 2014-2018. The Cohort analysis would help us understand the historical trends of the insured animal's risk characteristics based on the claim's statistics and the number of animal insured.

### 4.1 TYPES OF DATA AND THEIR DESCRIPTIONS:

Types of data collected from the Insurance Companies and department of Animal Husbandry for the last five years 2014 to 2018 have been given below:

1. Cattle Types and Breed wise (Indigenous/ exotic/ Cross Breed) claims statistics (for Cows & Buffaloes) consisting of number of claims, amount of claims (paid/ incurred) for last 5 years (2014 to 2018) with state wise break up.



2. Cause wise analysis of the claims: Death due to various diseases including outbreaks of diseases / Accidents / lack of nutrition, etc.
3. Business details: Number of animals covered, Premiums collected, average sum assured for each breed wise or cattle wise for last 5 years (2014 to 2018) with state wise break up.
4. Number of claims, average amount of claims paid for each type of animals with percentage of individual farmers and organized firms (Dairies/ Hatcheries)
5. Approximate percentage of marketing expenses including commission rates and operational expenses as the percentage on written premium/ Combined Ratio if available for each types of animals (Cows/ Buffaloes) separately.

## 5. DATA ANALYSIS:

Review of literatures on this subject and our interactions with insurance officials and experts in the field, helped us in identifying the above insurance related data for the initial analysis of cattle claims with a view to understand the morbidity and or mortality of the insured population as well as to identify relevant factors influencing the cattle claims. A brief list of claims analysis is given below:

1. Mortality rate of insured animals with breakup of type and breed wise classification
2. Overall Claims experience including loss ratio and burning cost analysis of the Cattle portfolio.
3. Claim frequency and Severity analysis of the insured animals with age, type and breed wise classification.
4. Age and Gender wise classification of animals with different breed and types.
5. Breed wise classification of insured claims: Indigenous/ Exotic/ Cross Breed
6. Mortality or Morbidity statistics of the insured animals with cause of death details: Digestive, Respiratory, Reproductive, Parasitic, Nutritional, Injury and outbreak of diseases, etc.

The required statistical data of the above parameters were collected from some of the leading Insurance Companies for the last 5 years and fed into a statistical package for the initial preliminary analysis including frequency and descriptive statistics. Then, preliminary statistical analysis covering frequency of claims across different types of cattle: Buffaloes, Bullocks, Calves/Heifers, Milch Cows, Mithuns and Stud Bulls, etc., along with types of breeds: Cross Breed, Exotic and Indigenous, were carried out across different states of the country to identify which regions or states contributes more claims and what type of cattle in these regions contributes to higher claims and also to find out what are the major reasons or causes for higher rates of claims.

Secondly, insurance related indicators such as frequency of claims and average size of claim, number of insured animals, loss ratio, average exposure, and average premium, etc., were also analyzed across different types of animals and breeds and also state wise analysis to identify what type of animals and breeds are more claims prone and have higher loss ratios in different regions. For this purpose, descriptive analysis including mean and standard deviations were carried out for incurred claims, claim frequency, sum assured, premium, number of animals insured, and loss ratio, etc.

## 6. ANALYSIS OF CATTLE CLAIMS:

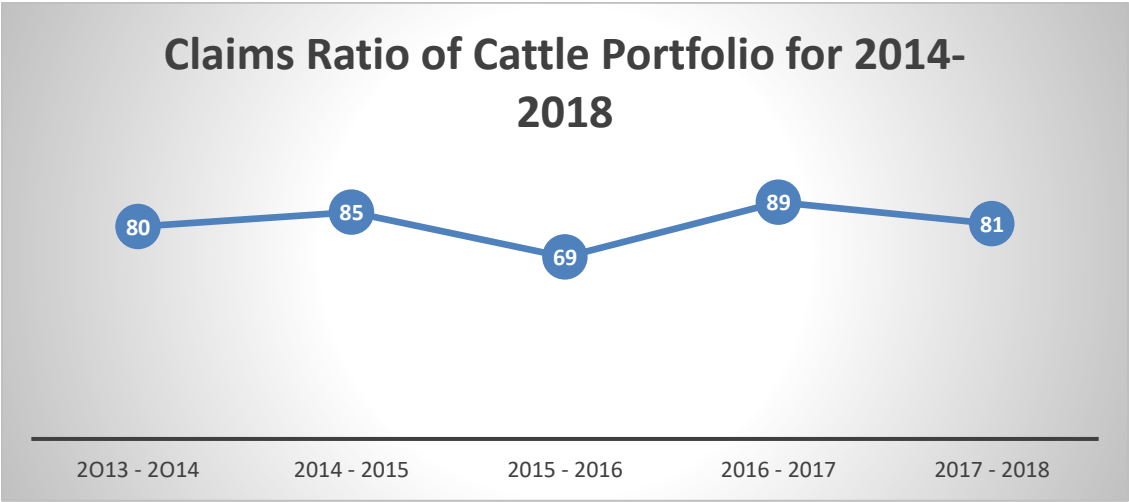
High Loss ratio of cattle portfolio has been the major concern for the insurers as it indicates not only increasing cost of claims but also raising incidence of claims, including fraudulent claims, along with higher volume of transaction cost and further it also affects the company's reputation in the rural areas. Analyzing the cattle claims across different risk parameters would help the insurers to identify the types of cattle, breeds across different regions/ states contributing to higher claims and loss ratio. Secondly, analysis of frequency and severity of claims across these selected risk parameters would help insurers understanding the burning cost which in turn would help in assessing the

adequacy of premium rates across different types of cattle as well as breeds. More importantly, such analysis would also help them in identifying the risk factors contributing to higher claims in various regions/ states across the country.

**6.1 OVERALL CLAIMS EXPERIENCE OF THE PORTFOLIO:**

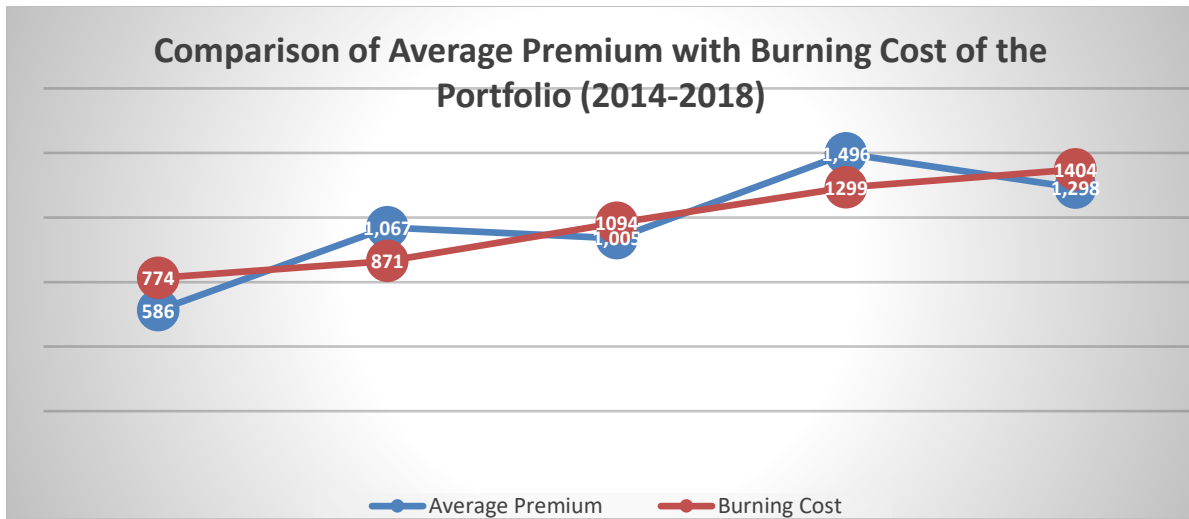
The chart given below indicates that over all Claims or loss ratio of the portfolio is around 80 to 90% which is really higher.

**Figure 2: Claims Ratio of Cattle Portfolio for 2014-2018**



The loss ratio of the portfolio has been consistently rising over 80% during the last five years from 2014 to 2018 except for the year 2015-16. Such higher loss ratio indicates that both the frequency as well as severity of claims is rising.

**Figure 3: Comparison of Average Premium with Burning Cost of the Portfolio (2014-2018)**

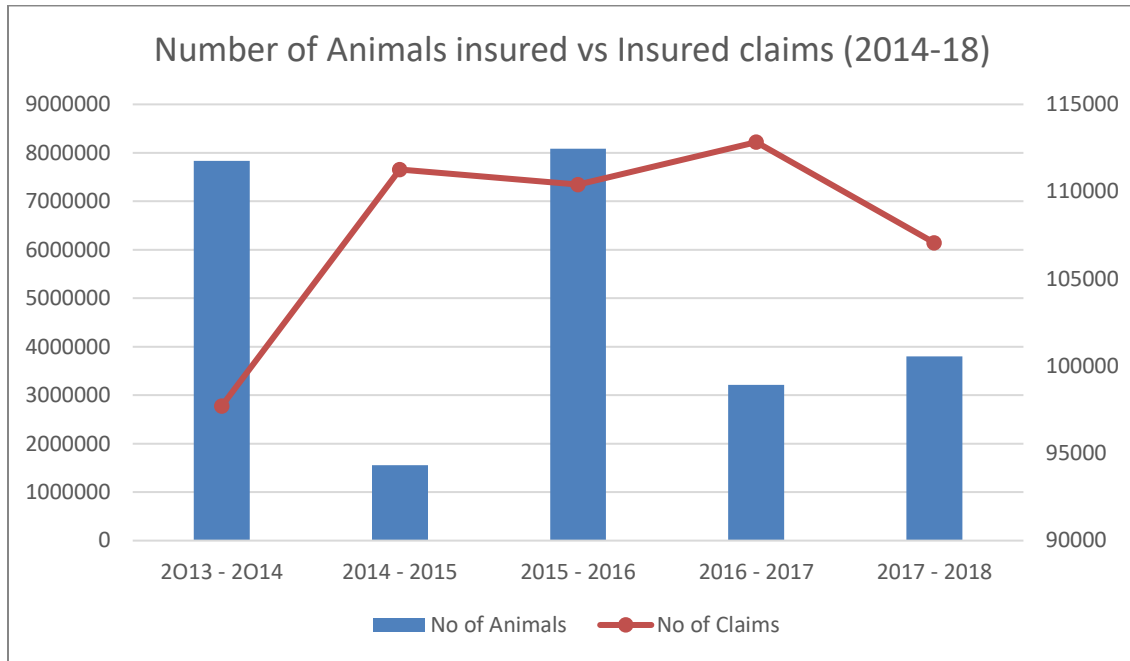


The above chart strongly correlates with the loss ratio as we find that the burning cost is steadily increasing over the years while the premium rates seem to be inadequate in meeting the claims cost.

### 6.2 NUMBER OF ANIMALS INSURED VS INCIDENCE OF CLAIMS AND INSURED MORTALITY:

Last 5 year’s analysis of cattle insurance claims indicates that the claims frequency/ incidences have gone up during the years 2014 to 2017 as the number of claims had gone up from 97700 (2014) to 112800 (2017) and the same has come down little to 1,07,073 in 2018. While the number of animals insured also has significantly reduced from 80.85 lakhs to 38.03 lakhs, which can be seen from the chart given below:

**Figure 4: Number of Animals insured vs Insured claims (2014-2018)**

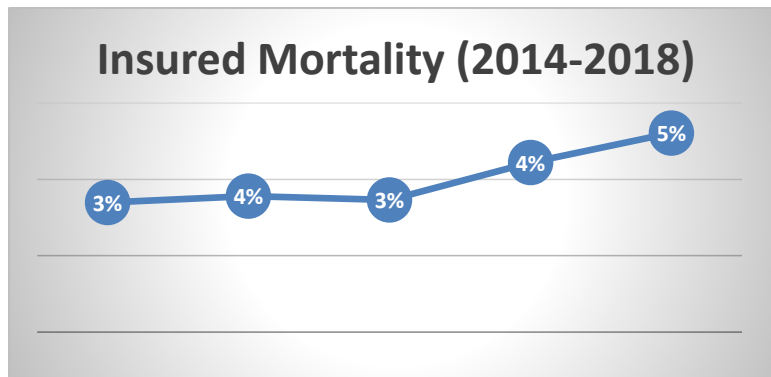


Even the number of animals insured under the National Livestock Insurance scheme has also come down from 14.80 lakhs in 2014 to 6.56 lakhs in 2017-18.

The linear trend of the analysis indicates that the number of animals insured is expected to go down further unless certain conscious effort is taken to increase insurance penetration for the portfolio.

### 6.3 INSURED MORTALITY:

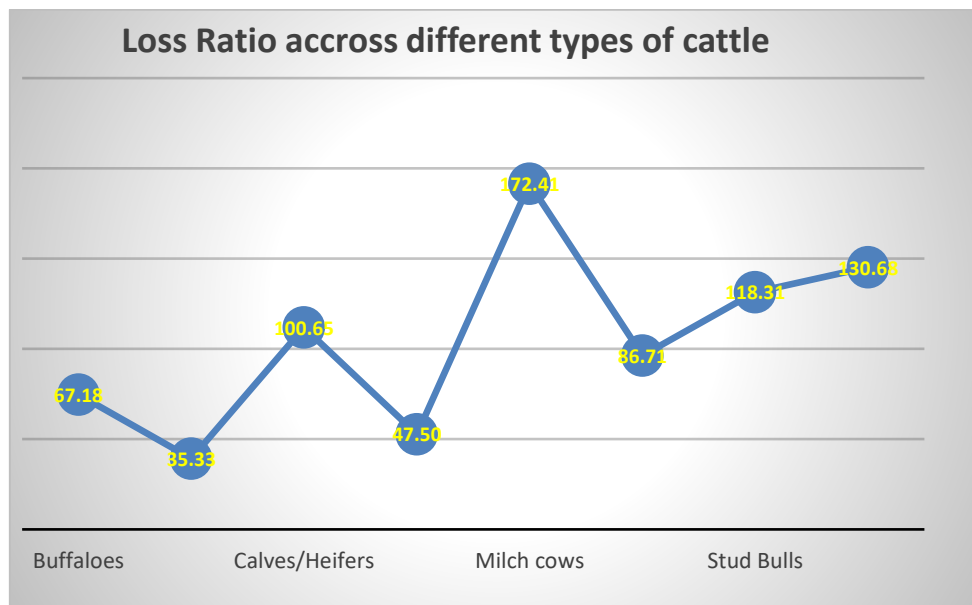
**Figure 5: Insured Mortality (2014-2018)**



The insured mortality has been estimated by taking into account the number of animals insured and the number of cattle claims over the last 5 years. The insured mortality for the last 2 years has gone up as we find that the insured mortality for the year 2016-18 is almost 5.2% as we compare it with the overall average mortality rate for the last 5 years which is around 4%. The main factor contributing to the increased insured mortality could be the number of insured animals has come down while the claims frequency has gone up in the last two years. It may be noted that, during the Kerala floods in 2018, nearly 75857 cattle are reported to have been died due to floods and landslide.

#### 6.4 CLAIMS EXPERIENCE ACROSS DIFFERENT TYPES OF CATTLE:

**Figure 6: Loss Ratio Across different types of cattle**



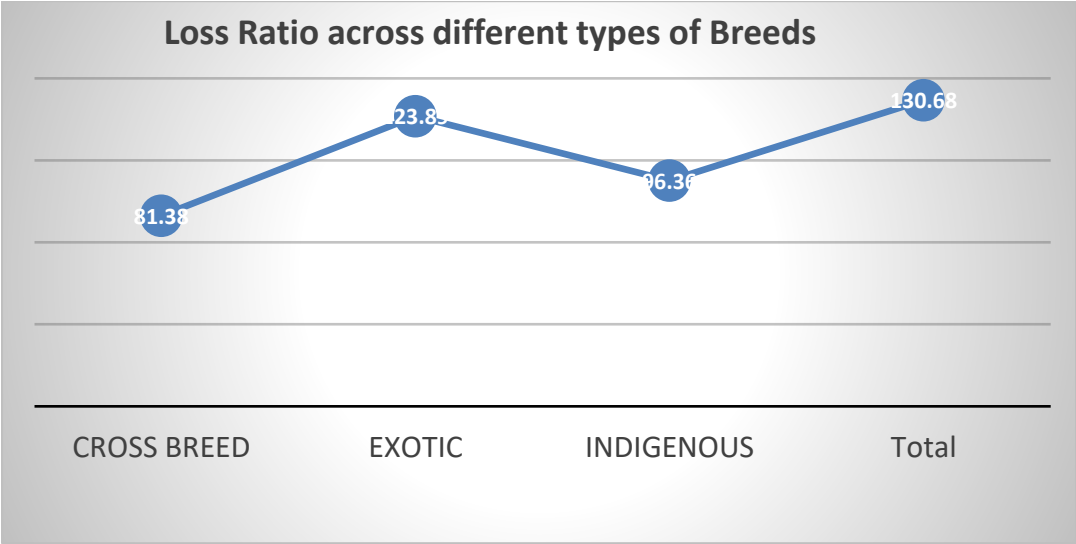
Among the different types of cattle, Milch Cows have higher loss ratio of nearly 172%. Similarly, Calves / Heifers and Stud Bulls also have comparatively higher loss ratio of over 100% while Buffaloes, Bullocks, Mithuns have lower loss ratio. This analysis indicates that Milch Cows and Calves particularly are susceptible to various diseases and secondly, management of cattle, particularly, how well the Calves and Heifers are being taken care by providing right amount of nutritious feed along with regular health

checkups and vaccination are the primary factors influencing the health of young Calves and Hiefers. Higher Claims incidences suggest that micro level analysis of the animals particularly, morbidity and mortality analysis across different types of diseases, demographic characteristics of the animals would help in identifying the primary risk factors affecting the higher loss ratio.

**6.5 ANALYSIS AMONG DIFFERENT TYPES OF BREEDS:**

Breed wise analysis of the claims experience indicates that Exotic and Imported Cattle contributes to higher amount of claims as we find that Exotic breed has comparatively higher loss ratio of 124% which might be due to the fact that exotic and imported breeds are highly susceptible for outbreak of epidemic diseases due to extreme or volatile weather condition of the regions and or unhygienic environment where these animals live.

**Figure 7: Loss Ratio Across different types of Breeds**



The risk exposures of these animals is also very high as their market values are very high. While Cross Breeds and Indigenous or local breeds have lower loss ratio as they are better adopted to the Indian climatic conditions and have better level of immunity as compared to the foreign breeds.

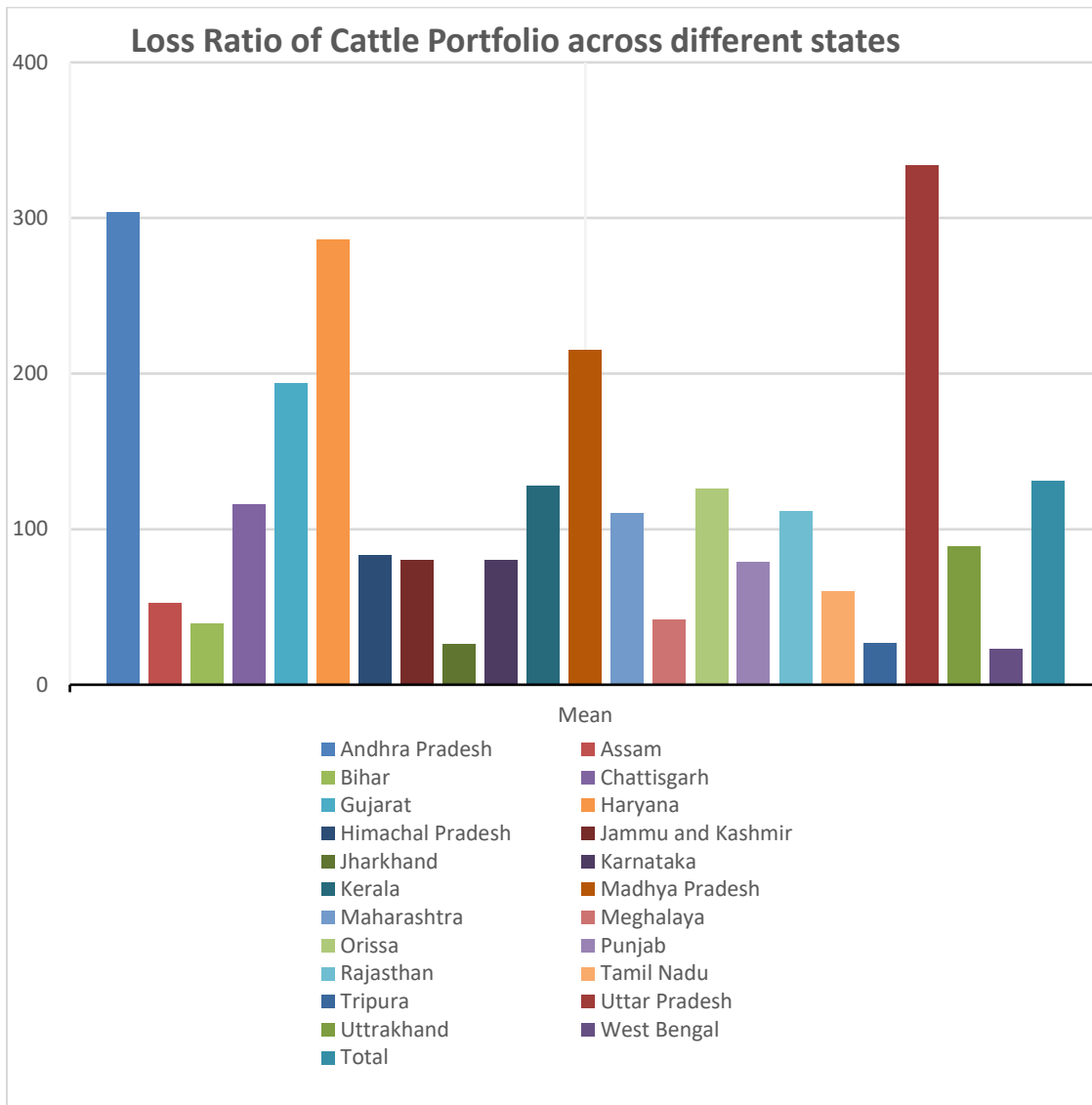
## 7. REGIONWISE ANALYSIS OF CATTLE CLAIMS:

To understand the overall claims experience across different regions or states of the country, the claims incidences and loss ratio of this portfolio were compared across different states. The analysis indicates that Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, Gujarat and Haryana contributes to higher amount of claims and the loss ratio of these states, particularly, Andhra Pradesh, Haryana, Gujarat, Madhya Pradesh and Uttar Pradesh is very high almost more than 200%. The main reason for such higher loss ratio could be most of these states have considerable number of high value animals and secondly, moral hazard of the animal owners in these regions might also be higher, particularly in the states like Gujarat, Uttar Pradesh, Madhya Pradesh and Andhra Pradesh.

While the states like Assam, Bihar, Jharkhand, Tamil Nadu, Karnataka and West Bengal have comparatively lower loss ratio of less than 80% and it is really interesting to observe that these states have larger number of cattle populations over 1 *Crores*. However, the states of Chhattisgarh, Kerala, Maharashtra, Orissa, and Rajasthan also have a loss ratio of more than 100% suggest that what contributes to higher loss ratio either low insurance penetration or erratic climatic conditions or Outbreak of epidemic diseases needs to be explored through morbidity and mortality analysis.



**Figure 8: Loss Ratio of Cattle Portfolio across different states**



## 8. CONCLUSION AND SUGGESTIONS:

It can well be ascertained from the above analysis that the overall claims experience of the portfolio is really very high as we find that the loss ratio of the portfolio has consistently been higher over 100% during the last five years. Such higher loss ratio could mainly be due to higher rate of moral hazard and anti selection among the insured animal owners. Particularly, the owners with large number of animals and private

dairies where the moral hazard and anti selection is observed to be higher as most of them do not insure all their animals and secondly lack of supervision and quality of tagging also contributes to such moral hazard.

Our interaction with animal owners and the veterinary doctors from the cooperative milk dairies revealed that one of the reasons for animal owners not coming forward to insure all their animals is the higher premium rates that we charge and secondly, majority of the owners do not find the insurance scheme as beneficial. They opined that they do not get the claims in time and secondly amount of claims that they receive from the insurance company is very limited and it does not help them in indemnifying their financial loss due to the death of their animals. One of the ways of reducing moral hazard and anti-selection is to increase the insurance penetration and second encourage the animal owners to insure their entire flock of animals. Another important feedback that we received from the animal owners is that they want the premium rates to be reasonable as the mortality rates among the cattle has come down and the competitors charge lesser premiums and most of the animal owners also opined that the present premium rates are not affordable for them.

Second, an interesting finding is that among the different breeds of cattle, Milk Cattle and Calves & Heifers have higher rate of loss ratio, while Buffalo and Bullocks/ Mithuns have lower loss ratio. Higher number of claims from milk cattle and calves could be mainly due to the reasons that cows and calves are vulnerable for various infectious diseases and epidemics. Secondly how well these animals are taken care by the owners in terms of right amount of nutritional feeding as well as regular health check ups and vaccinations, etc. contributes to the mortality and or morbidity of these animals.

Our interactions with experts in the field indicated that right amount of nutritional feed and timely animal health care are primary factors that can help in reducing the mortality of milch animals and calves/ heifers. Some of the large cooperative dairies like AMUL, Gokul, etc., have regular feed quality programs where right combination of milk replacement and calf starter feed is given to the animals at regular intervals with balanced nutritional supplements. They admitted that such programs reduced the mortality among the calves and heifers from nearly 30% to 14%. Secondly, these large cooperative dairies have 24 hours round of clock veterinary services with on-line monitoring of the health check ups of the animals owned by their members. They also charge very nominal fee of Rs.100 to their members. It has been observed that the mortality of milch animals in such dairies is well below 2%.

Claims analysis of different breeds indicated that Exotic or Imported cattle has higher rate of claims as the loss ratio of this breed is over 124%. Such a higher loss ratio could be because the exotic breed is highly vulnerable for various infectious diseases and also to extreme weather conditions.

Region wise analysis of cattle claims indicates that Uttar Pradesh, Madhya Pradesh, Gujarat, Andhra Pradesh and Haryana have greater incidence of claims as well as higher loss ratio. This could be mainly due to higher rate of moral hazard and most of the animals in these regions belong to high value exotic or cross breed animals. Almost all of these states have considerable number of animal population and secondly have very high potential for livestock insurance. Hence, it is suggested that the insurance companies can have tie up with some of the large cooperative dairies in these states which can help in enhancing the insurance penetration. This would significantly reduce the loss ratio in those states.

On the whole, the analysis helped us identifying the type of cattle, breeds, regions which are having higher incidence of claims and loss ratio. Further our interaction with the animal owners and the experts in this field, reveals that most of the animal owners do not come forward in taking cattle insurance mainly because of higher premium rates and they do not find the existing scheme beneficial. Hence, it is suggested that new cattle policy designed based on the animal owners feedback with innovative product options like long-term cattle policy with 3 years or 5 years duration, reimbursement of medical expense, loss of revenue to the owners when animal dies at younger age, floater policy covering a group of cattle under one master policy, return of premium with long term savings linked policy, etc., would attract the animal owners and cooperative milk dairies.

More importantly, the insurance companies can have a collaboration with research institutions like IVRI, BAIF, and Large cooperative dairies like Amul and Dairy development board like NDDDB, which are providing various farmers and cattle welfare programs like Cattle rearing program with balanced nutritional feed supplements, 24 hour's veterinary medical services in the rural areas with on-line monitoring of treatments, breed improvement and farmer's educational programs, etc. Such Collaboration would help in creating a perception among the animal owners / insured customers that the insurance company provides these value-added services to them. This would also make them perceive that the insurance is beneficial, and it is essential to insure all their animals.

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## CHAPTER - II

### ENABLING PARAMETRIC LIVESTOCK INSURANCE THROUGH TECHNOLOGY INTERVENTION

Anupama Rathore<sup>3</sup>, Vignesh Mahalingam Suresh<sup>4</sup>, Samuel John<sup>1,2</sup>, Chacko Jacob<sup>1</sup>

#### 1. Introduction

Parametric insurance is based on the definition of indexes for the occurrence of natural events. The policy gets activated when it exceeds the set parametric index. These contracts are based on time series of climate variables that are reported by weather stations. Parametric insurance climate indices act as an alternative to traditional coverages and show great potential as an effective risk management tool. These contracts do not require damage assessment, thus have high penetration and eliminate costs which gets reflected in lower contract prices.

Parametric livestock insurance coverage is designed to protect dairy farmers producing milk from the risk of adverse events of precipitation. Through these instruments, the compensation process is triggered when an objective index reaches certain pre-set levels. The coverage provided to producers assumes that the index is significantly correlated with production losses. The proposed insurance will cover extreme precipitation events of catastrophic type that are supposed to exceed the capacity of handling or management of this risk by the dairy farm producer.

The agricultural insurance market in low-income countries are underdeveloped due to the classical incentive problems related to asymmetric information availability and the high transaction cost of verifying losses. There are multiple case studies and research works published in the literature on the impact of parametric livestock insurance in the livelihoods of farmers. In [1], the author has presented an empirical analysis on the direct and indirect impacts of parametric livestock insurance in Southern Ethiopia based on a 4-year panel data. Results show that the parametric insurance had increased the household income and milk production during drought years right after the insurance pay-outs. In September 2019, the index-based livestock insurance triggered pay-outs for around 3000 smallholder cattle owners based on satellite data inputs after rainfall levels fell during the key rainy season of March to June 2019.

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In [2], the author proposes a parametric insurance model to help livestock pastoralists in northern Kenya to manage covariate risks of livestock losses due to drought. The model is based on the predicted livestock mortality index which is established from a statistical relationship between satellite-generated vegetation imagery and historical records of community level livestock losses. The Normalized Differential Vegetation Index (NDVI) acts as an indicator of vegetative cover with a spatial resolution of 30 x 30 km. The proposed scheme reduced the transaction costs and asymmetric information problems faced by the insurance companies, however, at the cost of increased basis risk, which refers to the imperfect correlation between an insured's loss experience and the index mainly due to lower spatial resolution of NDVI dataset. The authors had also developed and tested a gamification task in educating the values added by the index based livestock insurance to the pastoralists and concluded the outcomes of the game on how these findings are being used in the broader extension of the parametric livestock insurance product.

## 2. Need for Innovations in Parametric Insurance

One of the major bottlenecks with the existing indices for parametric livestock insurance is the basis risk. Basis risk arises when the correlation of index with the loss exposure does not match and a policy is not triggered during an actual loss event. This is mainly attributed due to the accuracy of the datasets used in modelling the indices. Typical satellite imagery sensing the normalized differential vegetation index with a spatial resolution of 30 by 30 km has higher possibilities of basis risks especially when applied to smallholder farmers. There is a need for innovative solutions that can increase the accuracy of the index modelling to reduce basis risk, a transparent claim process with quick settlements and customized products based on user demands.

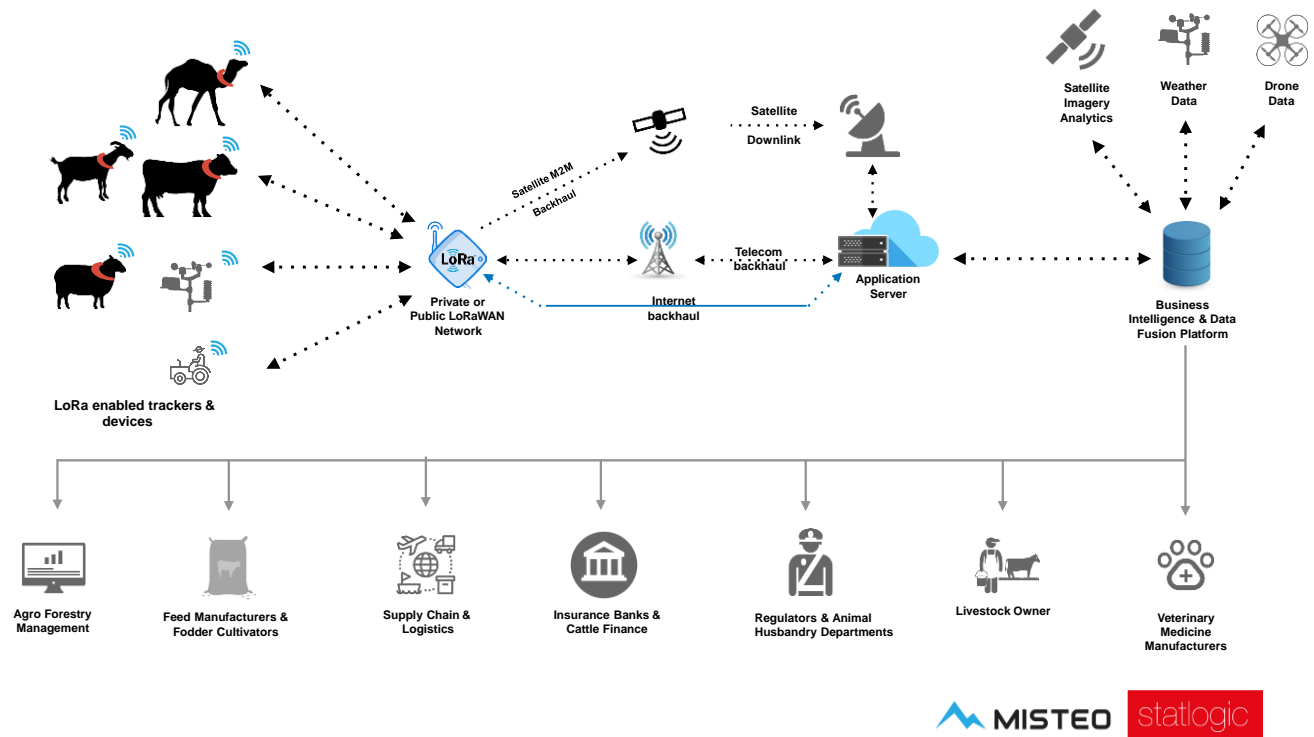
To overcome the problems related to basis risk and data gaps, we at MistEO and Statlogic are working with our partners and other stakeholders in the cattle industry to create off the shelf and bespoke farm and livestock security and tracking solutions for enabling efficient parametric insurance systems. Our proprietary geospatial and "Internet of Animals" platforms collect data from dense network of data sources ranging from bovine health trackers, micro weather stations, high resolution optical and surface acoustic radar satellite imagery to provide location specific, precise risk parameters that allows institutions to provide customized and accurate index based insurance for the farmers. This critical data benefits farmers by allowing to protect and secure rural business and home, raise productivity, automate to help combat labour shortages and attracting young farming talent using modern technologies.

### 3. Proposal: Internet of Animals for Behavioural Monitoring

Statlogic has developed an “Internet of Animals” solution by leveraging wireless sensor networks and machine learning techniques for continuous monitoring of animal behaviour. Taurus Care is a cost-effective bovine health tracking device that captures anomalies in the animal behaviour for dairy cattle. The device is in the form of a neck collar that is non-invasive, farmer friendly and requires minimal behavioural change for the end users. Figure 1 shows the tracker implemented and being tested at a private dairy farm in Perumbavoor town, Ernakulam district, Kerala. The device monitors key parameters such as time spent in rumination, feeding, resting, walking and grazing activities which are correlated with the health index of the animal using machine learning models. Figure 2 shows the solution architecture for the proposed internet of animals solution. The health index of the individual cattle combined with the weather index obtained from our dense network of micro-weather stations and high resolution satellite data enables to reduce the basis risk, enable customization of insurance products, close data gaps, increase penetration of livestock insurance and bringing multiple stakeholders to a single unified platform.



**Figure 1** Taurus Care: Bovine health monitoring device for behavioural monitoring in dairy cattle



**Figure 2** System architecture for the proposed Internet of Animals solution

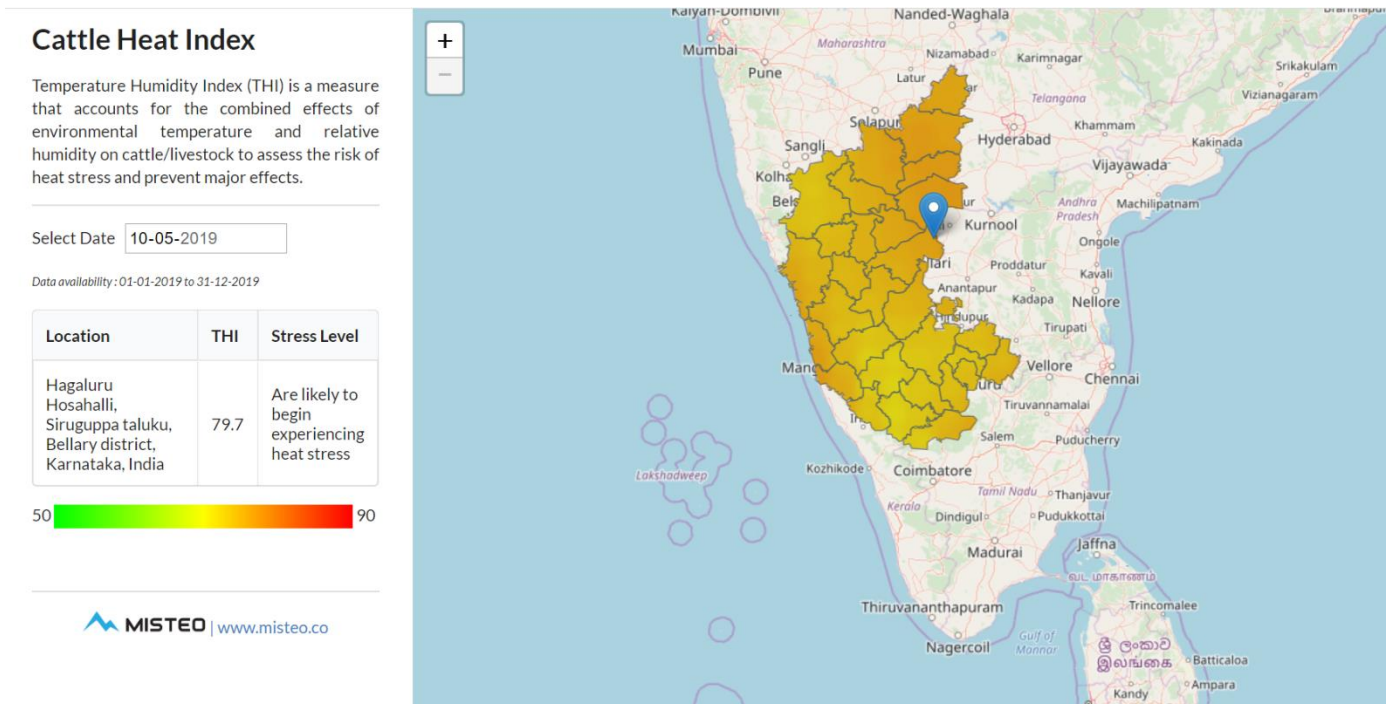
#### 4. Proposal: Index Models for Heat Stress and Torrential Rains

Heat stress is one of the major concerns which affect the production potential of dairy cattle almost in every part of world. High temperature and low relative humidity are the critical parameters contributing to heat stress. A parametric insurance coverage to protect dairy farmers producing milk against the risk of adverse events of temperature is proposed where the index coverage uses Temperature Humidity Index (THI) as an indicator of the occurrence of extreme events due to elevated temperature and humidity conditions.

Temperature Humidity Index (THI) is a parametric index that expresses the level of stress experienced by cattle as a function of air temperature and relative humidity. Per unit increase in THI beyond 72 reduces the milk yield by a factor of 0.2 kg in dairy cows [3]. For each point increase in the value of THI beyond 69, milk production drops by 0.41 kg per cow per day in the Mediterranean climatic regime [4]. Further, for every 1°C in air temperature above thermal neutral zone cause 0.85 kg reduction in feed intake, which causes ~36% decline in milk production [5]. Also heat stress can lead to higher udder temperature which may ultimately affect the udder leading to mastitis [6].



Figure 3 shows the heat map for the state of Karnataka depicting cattle heat index developed by MistEO based on historical dataset during 2019. The data sources include is data combined with the behavioural abnormalities from the Taurus Care platform provides precise decision insights to the cattle owners as well as veterinary extension service providers to mitigate heat stress and reduce yield loss. With access to high resolution (1 km x 1 km) spatiotemporal satellite imagery data and localised weather data from dense networks of micro weather stations, the index modelling becomes more accurate and precise in enabling parametric livestock insurance.



**Figure 3** Heat map of the state of Karnataka for mitigating cattle heat stress

Torrential rains have a direct impact on the milk production. Higher moisture levels reduce cow comfort and the availability of grass and forage becomes challenging. A parametric insurance coverage to protect dairy farmers against the risk of adverse events of precipitation was proposed for which the index coverage uses Standardized Precipitation Index (SPI) as an indicator of the occurrence of extreme precipitation events. Rainfall in mm is measured on daily basis from micro weather stations and any changes in the accumulated rainfall over a specified period for a historical series are notified. This enables to track the occurrence of events of deficit or excess rainfall at different time scales. Table 1 shows the preliminary parameters of the proposed coverage in Argentina against extreme events of precipitation.

**Table 1** Preliminary parameters of the proposed coverage for milk producers in Argentina

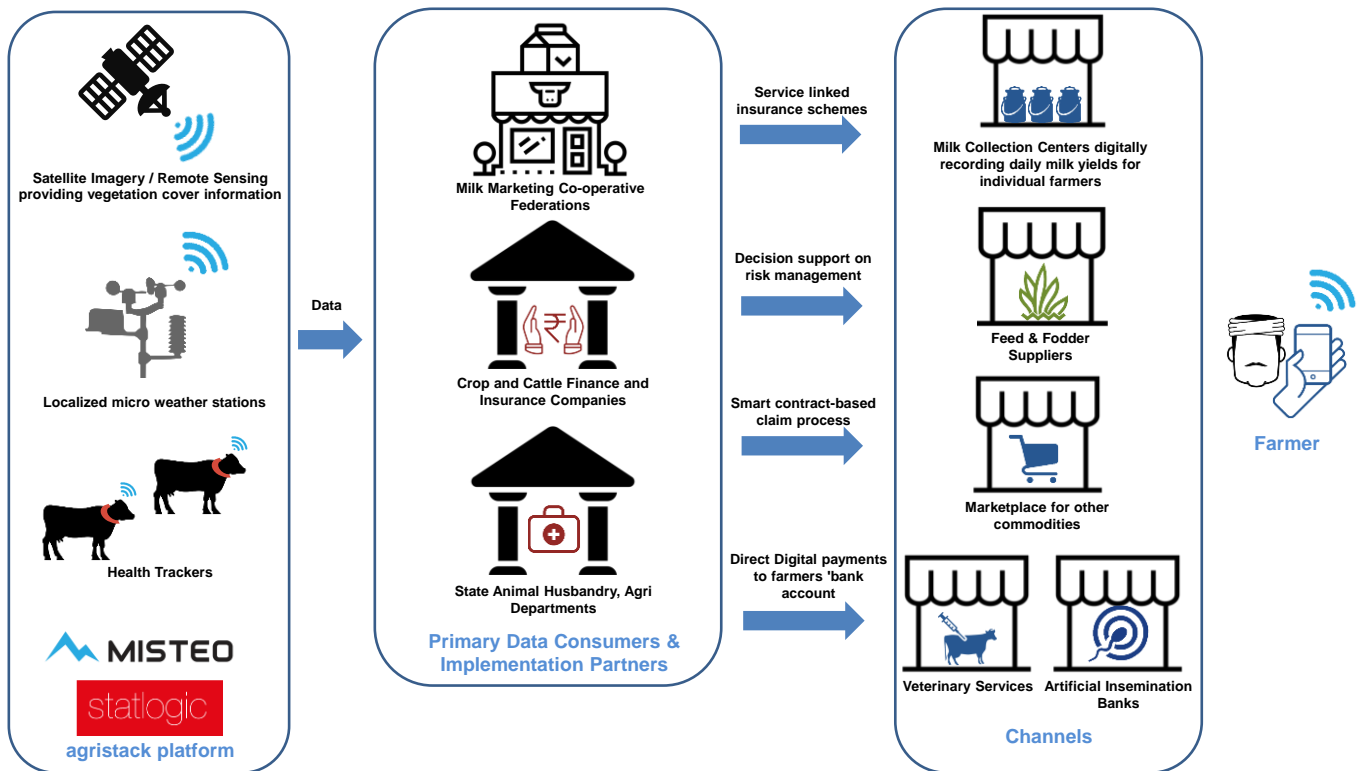
Detail	Parameter
Climate Indicator	Standardized Precipitation Index (SPI)
Insured Events	Extreme rainfall – Excess or deficit
Weather station	Distance between the insured dairy farmers and the weather station < 20 km
Extreme rainfall event Index – Deficit trigger	SPI for 6 months in range of -2 to -2.5
Extreme rainfall event Index – Excess trigger	SPI for 2 months in range of 2 to 2.5
Insured capital	Milk production
Contract period	More than 2 years

## 5. Benefits offered by the Proposed Models

Figure 4 shows the proposed model of implementing parametric livestock insurance favouring smallholder farmers. The proposed model offers following benefits.

1. **Better decision-making:** The real-time data received from cattle trackers through LoRa network allows to make better informed decisions for all the stakeholder. Farmers can track cow health and behaviour during illness, calving or lactation period and determine the value of livestock during the sale of by-products. Banking institutions will be provided with a credibility index of farmers based on the health and fertility index of the cattle in providing loans and credits.
2. **Lower mortality rates:** Farmers can benefit from healthier livestock without the need to over usage of antibiotics, faster diagnosis in the event of illness and lower mortality rates as a result of being able to identify issues and react faster.
3. **Benefit from lower insurance rates:** Farmers may be eligible to benefit from lower insurance premiums when they utilise our livestock monitoring platforms and solutions. By partnering with insurance firms, brokers and the government to offer farms using our solutions, a proportionate discount on annual insurance premiums can be offered which would boost insurance penetration rates. By partnering with other service providers like AI banks, feed suppliers and co-operative societies, service linked insurance policies could be enabled instead of credit linked insurance policies which would further encourage smallholder farmers to take up insurance for cattle.

4. **Financial inclusion for smallholder farmers:** Integration of our data platform with a digital financial inclusion platform enables betterment of farmers and rural women. National Agro Foundation, a NGO working for the upliftment of farmers and rural community across 5 states in India in collaboration with the Centre for Digital Financial Inclusion had developed KANCHI – Kisan Advancement through Cashless Innovation, a digital farmer financial inclusion platform for the benefit of farmers, rural women and their FPOs. The platform aims to bridge the gap between formal financial institutions and the rural community especially small and marginal farmers involved in dairy production improving access to credit from banks through credible transaction history, enabling cashless transactions of business operations of SHGs, dairy cooperatives, farmers groups and FPOs. This would help bankers to serve rural customers better.
  
5. **Farm hand security:** Farm hands working with livestock in remote parts of the countryside are at risk from accident, injury and potential attack from livestock and criminals. With our wide range of panic devices with two-way communication capabilities, immediate assistance can be provided on timely basis to protect the workers and the livestock they are handling.



**Figure 4** Proposed model for implementation of parametric livestock insurance

## 6. Solution Outcomes

- Enabling a comprehensive parametric insurance schemes including
  1. Life Cover for Livestock including death due to diseases.
  2. Medical Cover for Livestock including permanent disablement.
  3. Milk Yield Cover including yield/productivity losses.
- Increasing the penetration of insurance through service linked insurance policies and diversified insurance products based on various metrics.
- Blockchain based smart contracts for automated payment of insurance claims and government subsidies based on a parametric factor making claim cycles shorter, eliminating fraudulent claims and bringing transparency to the claim process.
- Increasing the share of milk production from dairy co-operatives and thus promoting the organized sector.
- Precise risk management support system enables climate smart crop and cattle farming and enabling resilient livelihood practices.
- Unified delivery platform for the veterinary and agricultural universities and the government for delivering new policies, products and services.

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## CHAPTER - III

### ISSUES AND CHALLENGES IN CATTLE INSURANCE



- 3.1 Lack of Awareness
- 3.2 Veterinary Infrastructure
- 3.3 Challenges in Valuation and Identification of Animals
- 3.4 Actuarial Pricing
- 3.5 Incentive System for Risk Reduction
- 3.6 Bundled and Comprehensive Insurance Products
- 3.7 Claim Settlement Processes
- 3.8 Recruitment, Training and Cooperation Of intermediaries
- 3.9 Infrastructure for Data Capturing And Data Integration
- 3.10 Government's Scheme, Initiative and Assistance

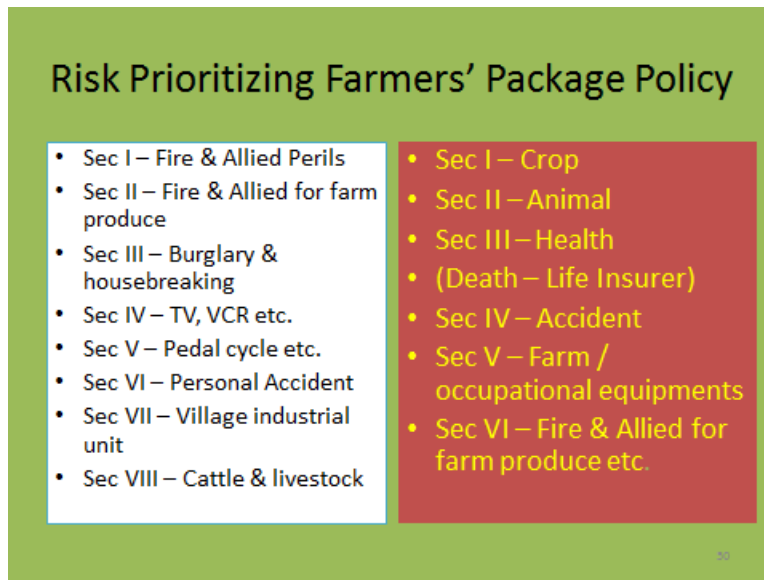
As against large population of cattle in India, very few are covered under insurance leaving a huge potential untapped. An in depth study of various issues hindering cattle insurance is of paramount importance for the farmers and the insurers.

### 3.1 LACK OF AWARENESS

Awareness and knowledge of cattle insurance among the farmers and rural household is substantially low in India. Traditionally a major chunk of cattle insurance is underwritten linked with bank credit and cattle of others are uninsured for various reasons. Our interaction with farmers revealed that a well majority of the farmers do not aware that cattle can be insured and a few who are aware have their own apprehensions/reservations about the hassles at the time of acceptance of insurance and settlement of claims. Insurers do take a very long time to settle the claims with lame excuses.

Another section of cattle owners' perception is that premium paid is a loss to them if no claim arises during the policy period. Yet some others, especially from the co-operative sector, feel that they can manage with a corpus fund kept aside in lieu of the premium to be paid for insurance and get rid of the hassles of insurance. Cattle insurance policy can be bundled with other insurance requirements of the farmer viz home insurance, farm produce insurance; equipment (tractor, etc) insurance, personal accident and health insurance for self and family members etc. Considerable number of farmers have also suggested for a comprehensive insurance policy meeting all their requirements through one master policy. The current Farmers' Package Policy can be modernized with the necessary prioritization and updated policy wording keeping in mind the livelihood risks of the farmer.

**Figure 2: Risk Prioritizing Farmers' Package Policy**



Service tax exemption on cattle insurance will be helpful for the farmers. Facility for easy transfer of cattle insurance policy as in motor insurance also helps in underwriting more cattle premium. Group insurance policies covering the cattle of all the members of a milk society or all the cattle owners in a village will be helpful in underwriting more premium leading to spread of risk and avoid adverse selection of risks. Premium load on the customer can be reduced by offering group discount for group insurance owing to reduction in administrative cost of procurement and administration and reduced mortality risks, through group risk monitoring.

Most of the farmers owning cattle are unaware of existence and availability of cattle insurance schemes or policies. Cattle bought by farmers by availing credit through banks or other financial institutions are insured even without their knowledge. Like wise cattle provided to farmers and others under government schemes are also insured most of the times without their knowledge. More or less both the categories of farmers are not aware of insurance, its benefits and the procedures to be followed to claim the money from insurer when the insured cattle die. Insurers should initiate steps to take insurance



to the doors of the farmers till they realize and cherish the necessity of insurance to their cattle.

### 3.2 VETERINARY INFRASTRUCTURE

34,500 veterinarians are only employed for field services as against the requirement of 67,000. Similarly, against the requirement of 7500 veterinary scientist for teaching and research only 3500 are available. Availability of para-veterinarians and other support staff are only 52000 as against the

requirement of 2,59,000 (11<sup>th</sup> Five Year Plan). This will have a very high impact on the cattle management, prevention and treatment of diseases leading to high morbidity



and mortality rate. This in turn effect cattle insurance portfolio management resulting in high loss ratios leading to enhancement of cattle premium rates which become unaffordable by the farmers. Ultimately it becomes a catch 20 situation ie Insurers do not insure cattle due to high loss ratios and farmers do not insure due to unaffordable insurance premiums. Government should take necessary steps on priority for creating appropriate infrastructure to meet the shortage of veterinarians and veterinary services.

### 3.3 CHALLENGES IN VALUATION AND IDENTIFICATION OF ANIMALS

Identification of animal is very important in cattle management and plays a crucial role in the success of cattle insurance. There are several methods of identification like cold branding, hot branding, fixing of tags to ears etc. Identification by ear tags is most commonly practiced in India and all over the world. There are certain short comings in




this method and most important one being high falling rate of ear tags and is a major issue in settlement of claims. Non- fixing of ear tags and making use of the tag for the death of even uninsured animal is causing a drain to the insurers. Of late RFID method is being used and of course yet to pass the acid test of stability and tampering. But the cost of it is so high and many farmers may not be able to afford.

However, our interaction with the supplier of injectable RFID chip and its reader to one of the PSU general insurance company revealed that the cost of the RFID kits has now come down (currently the supplier mentioned that the cost is around Rs. 100 for the micro- chip and Rs. 5000 per unit of reader device when the purchase is in bulk). The supplied items are being used for cattle identification by the insurer in Northern region.

In addition to, this as per the recent news report in Economic Times dated 31<sup>st</sup> January 2016, which is attached below, Retina recognition technology is now being used for cattle identification in the state of Andhra Pradesh.

**Biomatiques brings retina recognition for cattle identification | ET CIO**

Biomatiques' retina recognition technology offers easily solution for cattle identification (cattle UID) that would enable farmers to manage their livestock as well as allow government agencies and insurance companies in distribuion of monetary claims and aids to cattle ownersETCIO | 01 February 2016, 11:51 AM IST



Mumbai: Surat based Biomatiques Identification Solutions has introduced "Retina recognition technology" for cattle identification at recently concluded e-Governance symposium in Tirupati.

Biomatiques' Cattle UID - retina biometric technology for identifying cattle will enable cattle owners and farmers to get unique Ids for their cattle and will help them in insurance claims for livestock. Overall it will faciliate the farmers, government agencies as well as as insurance companies.

In India the concept of animal identification is not new however the methods used are either outdated or can be tampered around with easily.

With this retina recognition technology, Biomatiques has become the first Indian tech-security company to achieve this unique feat. Prior to this, Biomatiques has been offering biometric identification solutions in market for human identification based on recognition of irs of human eyes.

According to Tamaal Roy, CEO - Biomatiques Identification Solutions, RFID (Radio Frequency Identification) ear tags, ear marking, neck tagging with transponders, branding using hot iron or freezing methods, paint and tattoos are some of the methods used worldwide which pose serious health hazards to the bovines across the globe.

"However that's not the case with retina recognition and just like iris recognition method for humans, the retina identification is also a contact less technology. Privacy is another challenge in some of the methods like RFID ear tags as third party scanners can be easily used for tracking your cattle," said Roy.

Biomatiques has managed to supply 33,310 iris scanning devices to to Andhra Pradesh Govt, which will be used in various sectors like education, pension and ration distribution.

It is also the first Indian company to receive the STQC certification for its identification solutions from the STQC Directorate, Department of Information Technology, New Delhi.

### 3.4 ACTUARIAL PRICING

Maintenance of data and keeping records is not followed even in well-established large dairies. Farmers with one or two animals not even know the need and importance of record keeping. Recording data for each cow/ buffalo on parameters like pedigree information, date of birth, date of conception, date of first calving, milk yield per lactation, vaccination and de-worming details, disease attacks, feed details etc., will be very helpful for scientific management of farm and equally important for insurance. It is difficult to decide premium based on actuarial principles in the absence of such data and statistics leading to failure of insurance mechanism especially when it is transforming into a necessity and need of life. However, an attempt has been made in this study to estimate actuarial premium rates based on the mortality data collected from the department of Animal Husbandry and the sample survey of animal owners from the selected six states where considerable number of cattle population are present.

### 3.5 INCENTIVE SYSTEM FOR RISK REDUCTION

Risk management can be stated as the foundation on which insurance system is built and nurtured for its sustainability and longevity. It is very complex in nature and unique for each activity/business. Many risk management and risk reduction techniques involve huge cost. However, there are various institutions including Veterinary Research Institutions like IVRI, NDRI, and Animal Breeding centres, BAIF, NDDB, and State Animal Husbandry Departments, are providing various animal welfare and veterinary services including better rearing practices, genetic breeding, ration balancing feed programs, supply of quality feed, animal health care management, etc., to the farmers either at free of cost or at a nominal rate. They also conduct regular training in the above areas to the farmers and also enable them to conduct micro training to the fellow farmers at their own field.

When these services are implemented properly, they reduce or avoid occurrence of loss and results in better performance of insurance. Insurers should reward such customers by offering incentives to reduce their premium which will encourage them to go for much more risk management methods and this would be an ideal win-win situation for both.

### 3.6 BUNDLED AND COMPREHENSIVE INSURANCE PRODUCTS

Farmers have insurable assets like tractor and agriculture equipment, house and house hold goods, stock of farm produce in addition to cattle, all of which need insurance protection. Personal accident and health insurance are a must for the farmer and family members. Availability of bundled or comprehensive policy extending insurance to all the assets and other requirements would be more convenient for the farmer instead of opting for several policies. Insurers also will be able to procure more premiums and also will be able to offer some discount.

### 3.7 CLAIM SETTLEMENT PROCESSES

Claim settlement is the most important activity in insurance as far as customer is concerned. Claim amount should be paid within reasonable period and procedure followed is to be simple and easy for compliance by the customer. Documentation should be minimum and easy to procure. Timely settlement of claim with proper guidance is the virtual service which a policyholder expects when a loss is reported. Policyholders' service guidelines stipulated by IRDA are to be strictly complied with. Insurance being a service sector industry, its growth and survival depends on the quality of service extended to its customers.

### 3.8 RECRUITMENT, TRAINING AND CO-OPERATION OF INTERMEDIARIES

Every insurance product requires intermediaries. Since more than 90% of the cattle are in the rural areas and the nature of business is retail with large volume, intermediaries in large numbers are required. They have to be recruited from the dairy stakeholder system to generate sustainable business opportunity and ensure continuity of insurance and profitability. Depending solely on banks and lending institutions is not a viable practice for healthy and sustainable growth of the portfolio.

Since cattle insurance is a retail portfolio, sincere efforts should be put by the intermediaries/sales executives to explain the benefits of insurance and convince the farmers to opt for insurance of their cattle year after year. Cost incurred in procurement of premium would be more and intermediaries are to be suitably paid. One way their earning would improve is if they can be incentivized to bring more cattle numbers. This can be done by those in the ecosystem such as inseminators. They should be recruited in large numbers. Imparting proper training and continuous guidance and support to the sales personnel for prompt and timely delivery to the customers is the responsibility of back office.

### 3.9 INFRASTRUCTURE FOR DATA CAPTURING AND DATA INTEGRATION

For a better management of cattle insurance portfolio, it is essential to have the required statistics collected at regular interval by the company. For this purpose, a table providing the format with necessary cattle insurance statistics is given below:

**Table 4: Cattle Insurance Statistics**

FIN YEAR	BREED	CATTLETYPE	STATE NAME	NO OF CLAIMS PAID	CLAIM PAID	Number of Animal covered	PREMIUM
2014	CROSS BREED	Buffaloes	Andhra Pradesh	465	9450799	9518801	1847825
2013	CROSS BREED	Buffaloes	Bihar	13	193631	192939	156862
2012	CROSS BREED	Buffaloes	Chattisgarh	36	653886	573006	1747228
2011	CROSS BREED	Buffaloes	Gujarat	3823	50797102	50442752	19100
2014	CROSS BREED	Cow	Karnataka	138	1752100	1781500	171429
2013	CROSS BREED	Cow	Madhya Pradesh	402	7068225	6838415	29656
2012	CROSS BREED	Cow	Maharashtra	169	3059672	3281582	450
2011	CROSS BREED	Cow	Rajasthan	230	3595066	3526491	4694745
2014	CROSS BREED	Bullocks	Gujarat	90	496300	490300	7741356
2013	CROSS BREED	Bullocks	Madhya Pradesh	14	94950	94950	408787
2012	CROSS BREED	Bullocks	Maharashtra	12	170100	170100	332463
2014	CROSS BREED	Calves/Heifers	Andhra Pradesh	39	444413	483446	362228
2013	CROSS BREED	Calves/Heifers	Gujarat	89	1589550	1491300	6219931
2010	CROSS BREED	Calves/Heifers	Kerala	84	427350	431550	620525

# Data given in the above table is a sample data.

The cattle insurance data needs to be integrated with the demographic characteristics of the cattle, rearing practice, Feed management, animal health including morbidity and mortality related statistics to understand overall performance of the portfolio, i.e.

Claims frequency and Severity analysis, loss ratio, mortality rate, business performances, etc. Further, these data needs to be analysed across different cattle type, breed wise, customer type wise (individual farmers, private dairies, co-operative dairies, etc., across different regions. These basic analyses would also help the company to assess overall health of the portfolio and also check whether the premium rate being charged currently by the company is adequate in covering the claims and the portfolio is profitable, etc.

### 3.10 GOVERNMENT'S SCHEMES AND INITIATIVES

In lieu of the importance of milk and milk products and the growing demand for them in India and abroad, Government is putting lot of thrust for development of cattle rearing in India. Numbers of research institutions are established all over the country for developing techniques to upgrade indigenous cattle for higher milk yield and for production of vaccines and medicines. Cattle are also provided under various schemes to the landless labourers and small and marginal farmers to bring them up economically.

The Department of Animal Husbandry has initiated lot of programs for helping farmers in animal upkeep and welfare in different states. These programs assist farmers through supply of cattle, financial assistance, supply of feed and medicine at both free of cost or at subsidised rates, and premium subsidy etc. Premium rates are subsidized for cattle provided under other schemes initiated by the government.

Livestock Insurance Scheme introduced by the central government is being operated in 300 selected districts. 50% of the cattle insurance premium is born by Government and the rest by the cattle owners. An amount of Rs. 47.65 crore was released to state governments and 10.88 lakh cattle were insured during 2013-14.

The department (i.e. DAH) is providing continuous assistance to the State Governments too for scientific management and up-gradation of genetic resources, increasing availability of nutritious feed and fodder, sustainable development of processing and marketing facilities, enhancement of production, prevention and control of cattle diseases. Following are the different programmes organized by the Government in the context:

1. National Livestock Mission – to promote availability of feed and fodder to substantially reduce the gap between availability and demand.
2. National Disease Control Programmes – Effective control of major cattle diseases like FMD, PPR and Brucellosis.
3. Artificial Insemination Programme – to improve productivity of milk by genetic improvement.
4. National Programme for Bovine Breeding and Dairy Development – Breeding and dairying will be more effective along with artificial insemination services, feed management and marketing of good quality of milk for improving the productivity.

Recently, Government of India has also introduced Animal Identification program using unique identification number similar to Adhar card as well as capturing demographic characteristics of the animal i.e. age, gender, breed type, weight, lactation stage, pregnancy, milk yield, vaccination and health status of the animal, etc., Such programme has been introduced in the states where considerable cattle population is present. Such programme would provide certain useful annual statistics including mortality data and the same can be used by the insurers for estimating actuarial premium rates.

## CHAPTER - IV

### EXPLORING LIVESTOCK INSURANCE PENETRATION IN INDIA

Livestock insurance is an all time contextual need for our country where majority of poor farmers are thriving on the income generated through various means of products being produced by them like, milk, meat, wool & other draught purpose. In term of insurance protection, focus of course is primarily being seen for milch cattle providing protection to Cows & Buffaloes.

In fact it is of equal concern & need that other livestock animals like Sheep, Goat, Camel, Pigs, Poultry, Fishries etc which are contributing to the livelihood of poor farmers also provided an insurance protection so that not only other livestock wealth of country is protected but also ensure protection for the income & livelihood.

Rural insurance has tremendous scope to expand as business activity as well as uplifting the socio-economy of the rural India. It is good that most of the insurers are having specific designed policies for all above mentioned livestock animals.

The penetration is still at very low level restricted to the extent of financial protection to the Bankers towards their interest of loans advanced for livestock rearing. The real cause need for insurance is not for the protection for Banks interest but for the poor farmers suffering which sometimes is extremely vulnerable because of no insurance protection to their livestock. Majority of farmers are even not aware of any such insurance protection is available to them for their livestock.

It is also a recorded fact that Insurers are insuring only bank financed livestock & generally not going for individual policies. Govt. of India & State Govt through their Animal Husbandry department are supporting & promoting various schemes for boosting rearing of livestock animals and also arranging for insurance protection for all such livestock animals by subsidizing greatly for the premium. The steps so far taken are just insufficient. A lot more concerted efforts are required to be done as a major socio-economic responsibility jointly by Govt & Insurance companies to go in a big way targeting to reach to protect to every poor farmer's source of livelihood which is happening through keeping of various animals.

India is one of rich country in the world having variety of livestock wealth producing milk, meat, wool & other products. Insurers can contribute in a big way as social cause



by providing insurance protection for all thereby not only ensuring protection but boosting the rural economy.

It is true that insurance companies are not having encouraging claim experience and inadequate distribution support is making more difficult to reach to the rural area to provide the insurance protection. Moreover, lack of knowledge, poverty is other hindrance for lack of penetration. Insurer's experience indicates that there are instances of moral hazards causing adverse claim, which is major deterrent factor in increasing penetration, but this aspect can now be effectively looked into with use of state of art & IT. The digital support the approach can be improved. Digital reach has opened many dimensions by creating new channels of distribution & ease of reach to every nook & corner overcoming physical verification etc.

India has vast resource of livestock & poultry, the population as per Annual Report (2018-19) of Department of Animal Husbandry, Dairying & Fisheries, Govt of India is as under:

<b>S.N.</b>	<b>Species</b>	<b>17<sup>th</sup> Livestock Census 2003 (no. in millions)</b>	<b>18<sup>th</sup> Livestock Census 2007 (no. in millions)</b>	<b>19<sup>th</sup> Livestock Census 2012 (no. in millions)</b>	<b>Growth Rate (%) 2007-12</b>
1	Sheep	61.5	71.6	65.07	-9.07
2	Goat	124.4	140.5	135.2	-3.82
3	Pig	13.5	11.1	10.3	-7.54
4	Other Animals	2.2	1.7	1.48	-3.33
5	Poultry	489	648.8	729.2	-12.39

## 1. Need of Insurance

It is imperative to expand the rural insurance in view of Livestock sector is an important sub sector of agriculture & rural economy. It forms an important livelihood activity for most of the farmers & poor people in the rural area. They are severally exposed to various natural calamities of flood, draught & other accidental exigencies causing harm to the people & livestock thereby directly to the source of livelihood income being

generated through keeping of animal for various. It is imperative for the insurance industry to provide protection through various schemes for variety of animals.

Animal husbandry provides supplementary income to small and marginal farmers and it employs women in large numbers. Providing insurance coverage can protect them from losses in calamities. State governments and insurance companies need to do much more to popularise animal insurance products.

General insurers right after Nationalization have been conscious of their social commitments by having specific policies for all kind of animals. Even after privatization of as per IRDAI regulations specified proportion of the business has to be generated by various rural insurance schemes, which includes livestock insurance policies for Sheep, Goat, Camel , Poultry, Fisheries and bee keeping etc and also other micro insurance products for personal accident cover to people.

Various livestock insurance Scheme provides rates, terms and conditions to underwrite the animals like Sheep & Goat, Camel, Pig Insurance Business in India. The policy cover is provided to all Indigenous, Cross-bred and Exotic animals. The policies are specifically named for various types of animals but most of these policies are having similar scope of cover, exclusions & underwriting procedures.

## 2. Scope of Cover

The policy shall provide indemnity against death of livestock animals due to accident including Fire, Lightning, Flood, Cyclone, Famine, Earthquake, Landslide, Strike, Riot or diseases contracted or occurring during the period of insurance.

## 3. Common Exclusions

*Malicious or willful injury or neglect, overloading, unskillful treatment or use of animal for purpose other than stated in the policy without the consent of the Company in writing. b) Accidents occurring and/or Disease contracted prior to commencement of risk. c) Intentional slaughter of the animal except in cases where destruction is necessary to terminate incurable suffering on humane consideration on the basis of certificate issued by qualified Veterinarian or in cases where destruction is resorted to by the order of lawfully constituted Authority. d) Theft and Clandestine sale of the insured animal. e) War, Invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection, mutiny, tumult, military or usurped power or any*

consequences thereof or attempt thereat. f) Any accident, loss, destruction, damage or legal liability directly or indirectly caused by or contributed to by or arising from nuclear weapons. g) Consequential loss of whatsoever nature. h) Transport by air, and sea. i) Any non-scheme claim arising due to diseases contracted within 15 days from the date of risk are not covered.

#### 4. Underwriting

*All Insured animals should be suitably identified by metal ear tagging and/or tattooing method. Natural identification marks should be clearly noted in the proposal and veterinary health certificate.*

#### 5. Claim Procedure

*In the event of death of animal immediate intimation should be given to the Company and the insured should furnish the following documents and required information.*

- 1) Duly Completed Claim Form*
- 2) Death Certificate from a Veterinarian on Company's form.*
- 3) Post Mortem Examination report.*
- 4) Ear tag wherever applicable.*

#### 6. Issues & Challenges

*Owing to the conducive climate & topography, Animal Husbandry, Dairying & fisheries and has become a difficult insurance proposition to reach to all areas. Insurance business requires effective underwriting & claim process to render better services, thus have typical issues & challenges.*

- Unorganised market*
- Poor veterinary infrastructure*
- Absence of actuarial pricing*
- Adverse selection*
- Valuation & Identification of animals*
- Challenges in valuation and identification*
- Claims settlement process*
- Absence of concentrated marketing*

- *Lack of awareness & Publicity*
- *Insufficient distribution network*
- *Illiteracy & non-interest of rural people*
- *High procurement cost*
- *Poor paying capacity*
- *Lack of awareness*
- *High incidence of moral hazard*
- *Wide range of exposure and vulnerabilities*
- *Claim settlement*
- *Fraud control*

## 7. Recommendations

The present livestock insurance market with its limited penetration is considered insufficient and requires substantial investment and innovation for it to become a wholly successful venture. The future of livestock insurance is still uncertain and the policy development needs to be coordinated. Interest in developing the insurance of animal husbandry is increasing presently due to the drastic environmental impact on low-income households.

Livestock insurance need to be effectively taken up with government and industry working together. Insurers need to look for better distribution network reach in the rural area and more comprehensive cover and think innovatively to move towards complete livestock management systems. State government support for prevention, control and the regulation of various risk management and risk transfer practices has to be all along for effective implementation.

The limited governmental and private efforts have been undertaken for technology improvement and this will materialise with an increased use of technology in the distribution of product, identification of animal and cash management.

Technology can be leveraged for fraud control, non-cash channels, and alternate mechanisms for animal identification and valuation. This will make non-profitable portfolios viable and profitable and consequently lead to a reduction in premiums and greater willingness and ability to pay on the part of cattle owners.

The livestock insurance sector should aim to build livestock management systems. Risk reduction and risk transfer systems should be integrated so that the overall

performance of the livestock sector can be improved. Insurers should ideally take the residual risk. Residual risks result when it is indicated how adequately the individual producer practices and the government carry out its responsibilities. This will be assessed by the insurance industry and the government as policies are developed for livestock producers. These policies have to be priced adequately in order to produce profit for insurance companies, yet it has to be competitively priced to ensure that the policy is affordable to the producer. Procedures for premium payment, claim and other services should be formalised along with increased customisation of products to suit the needs of low-income households. (ref. Livestock Insurance: Lessons from the Indian Experience, Dr Anupama Sharma)

## SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

Summary of Findings: A brief summary of the study is given below:

1. The overall loss ratio of the Cattle Insurance Portfolio has consistently been over 100% during the last 5 years (2014 to 2018), which indicates that both the number of claims and the insured animal mortality is higher.
2. The insured animal mortality is nearly 5.2% which is slightly higher as we compare it with general mortality of animals based on the sample survey. The general mortality of the animal is around 3.2%. The main reason for higher insured mortality is high moral hazard and anti-selection and the number of animals insured has also come down in 2016-18.
3. In addition, lack of supervision by the insured officers/intermediaries is also contributes to moral hazard of the insured claiming for the death of non-insured animal also for the claim. During our interaction with the animal owners, most of them opined that the company officials should visit the place immediately on intimation of the claim which can reduce the moral hazard considerably and it would also help in accelerating faster claim settlement.
4. Another major cause contributing to the moral hazard, is the Animal Tags. The present type of animal tagging is not 100% foolproof as it is being either tampered or lost during the normal course of animal movement. Hence, it has been suggested that new modern radio frequency enabled tagging i.e. RFID enabled tagging or genome tagging may be used. Currently, few companies are already using RFID enabled tagging and recently one agency in Maharashtra is experimenting with Genome tagging which captures the animal tissues while tagging and the tissue can at any time be tested for DNA or parent matching. Such tags bear animal identification with unique number which can easily be verified at the time of death of the cattle.

5. However, one of constraints of these modern tagging is the higher cost of the reader. It is expected that if the volume of ordering of such tags is larger, then the cost may come down significantly. Interestingly, we come to know from one of tag manufacturer in Delhi that some insurers have already started using such RFID animal tagging for animal identification for their cattle insurance portfolio. It is also suggested that considering the cost of RFID tags, Polyurethane tags which is of smaller size can also be used and the same has been used by large cooperative dairies like AMUL, Gokul, etc. It has also been reported by them saying that the falling down ratio of these animal tags is considerably less. It is suggested that the insurance companies may try to use either small size polyurethane tags or RFID enabled tags.
6. The major cause of death of the cattle is due to infectious and digestive diseases as they account for nearly 80% of the claims, followed by accidents (16%) and Permanent Total Disablement (PTD) is 4%. The major type of disease that affects the animal mortality is Digestive disorders as we find that major cause of death reported in the insurance claims is due to infectious and digestive diseases i.e. Ruminant Tympany, Acute Bloat and Acidosis, etc.
7. This analysis suggests that farmers and animal owners need to be educated about importance of animal management, regular health check ups along with deworming and vaccinations. Besides health care, feeding the animal with balanced nutritional feed can also help in minimizing digestive disorders and infectious diseases to a large extent.
8. The Out break disease analysis indicates that the major disease that affects the animal mortality is Hemorrhagic Septicemia, followed by Black Quarter. In most of the states, Foot and Mouth Diseases (FMD), Anthrax and Swine Fever have now been drastically eliminated due to timely vaccination and treatments by the state animal husbandry department.

9. The analysis indicates that the burning cost of the portfolio is really high as we find that the total claims outgo of the portfolio is higher than the premiums collected.
10. The claims analysis indicates that Milch Cows account for maximum number of claims nearly 56%, followed by Buffalo (37%) and Others including Calves and Heifers is 7%.
11. The breed wise analysis indicates that Exotic or Imported Breed accounts for higher amount of claims in terms of Severity as we find that Exotic breed has comparatively higher loss ratio of over 124%, while Cross breeds accounts for maximum number of claims (58%).
12. The mortality analysis suggests that the premium rates need to be differentiated across different types and breeds of cattle. Accordingly, in this study, risk based premium rates have been worked out for different types and breeds of cattle considering various rating parameters. Keeping in mind, current competitive market conditions, past claims experience, and animal management, the premium rates can be adjusted. Accordingly, suitable discounts can also be considered looking at commercial /marketing as well as animal potentiality, which can help improving the insurance penetration for cattle portfolio.
13. Region wise analysis of cattle claims indicates that Gujarat, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, and Maharashtra have higher loss ratio of over 200%. In terms of number of claims, Gujarat accounts for nearly 30% of the claims, followed by Andhra Pradesh (16%), Maharashtra (9%), while Karnataka, Kerala and Tamil Nadu accounts for 8% of the total claims respectively.
14. Our survey with the animal owners and Veterinary Doctors in those selected states indicates that the amount of insurance claims that the farmers' / animal owners receive from the insurance companies is perceived to be highly inadequate as the market value of animals have gone up significantly in recent years. Our analysis of the insurance claims also indicates that the average paid claim is around 25000



while the average value of cattle is Rs.50000 (Minimum value).

15. Most of the animal owners perceive that they do not benefit from the cattle insurance as the claims are mostly paid to the financial institutions / banks directly since the insurance is generally done by the banks when the owner takes a cattle loan from the bank. This suggest that the insurance companies should target the individual animal owners for cattle insurance and the cattle insurance policies should be designed based on the farmers' / animal owner's feedback.
16. Many insured animal owners opined that it takes longer time (more than 3 months) to receive cattle claims from the insurance companies and the settlement process is not simple as it requires submission of claims form, tags, and a death certificate from a local veterinary doctors for which they have to pay a considerable sum to the veterinary doctors, plus, some times they have to pay to agents or other intermediaries also to receive the claim. Most of the insured animal owners suggested that the claim settlement process needs to be further simplified and insurance officials should visit the place immediately on intimation of the claims and take photograph of the animal on their mobiles and upload them directly to the insurance company and the claims should be settled immediately.
17. Majority of the animal owners opined that the current premium rates are high and not affordable for the farmers. They suggested that if the premium rates are made reasonable around 2%, then many farmers/animal owners would come forward insuring their animals.
18. Our analysis of the individual animal owner's survey indicates that the overall animal mortality is quite low around 3% and most of the individual owners take care of their animal very well due to better awareness, availability of feed quality and veterinary services by most of the organized dairies. Most of the large cooperative dairies and research Institutions like IVRI, BAIF, NDDB, etc., regularly organize training programs to the farmers creating awareness about animal health,

feed quality, better rearing practices, etc.

19. Similarly, mortality of the animals maintained or supported by organized milk cooperative dairies like AMUL, GOKUL, etc., is quite low around 1% to 2%. Most of these large organized dairies have the Veterinary Medical Services available round 'o' clock to the farmers at a very nominal charge. They also have Calves / Heifers rearing programs with better feed quality supplements. They provide feed supplements like Milk Replacers, Calf Starters and Balanced Nutritional supplements, which not only enhances the animal health and milk yield, but more importantly, it reduces the animal mortality drastically.
20. A majority of the animal owners opined that they should receive some value back when there is no claim for considerably longer period of times. They suggested that insurance companies should come out with longer duration policies for 3 to 5 years with a return of part premium or some value back to them in case if there is no claim.
21. They opined that A savings linked cattle insurance policy with a return of accumulated savings fund at the end of the policy period would be an attractive policy feature and insurance companies can charge savings premium extra apart from pure risk premium.
22. Similarly, majority of owners suggested that One master policy covering the entire animals in line with a family floater policy available for health insurance, would be attractive to them.
23. Another interesting observation is that most of the owners feel that currently there is no insurance policy available covering medical expenses of the animal particularly, major surgical treatments.
24. They also opined that when the animal is lost, the owner requires a lump-sum money immediately to purchase another animal and he also losses his future revenue from the animal. Hence, a majority of them suggested that an insurance

- policy providing loss of revenue due to death of the animal would really be useful.
25. Since most of the animal owners are now well connected through milk cooperative dairies or milk unions in every district, it has been suggested that the premium can be collected in multiple installments. they also suggested that the Cooperative dairies/ milk unions can deduct these premiums from their payments that they make to the owners while collecting the milk. this will encourage many farmer's/animal owners taking insurance protecting their animals.
  26. Our interaction with the officials from cooperative dairies and BAIF suggests that the milk collection employees and inseminators can be appointed as micro agents and their services can be utilized for procurement of rural business and claim settlement services.
  27. Similarly, it is observed that there are about 1,54,882 post-offices and nearly 90% of them are located in the rural areas. These postal offices are already engaged in selling postal insurance, banking and savings among the rural people. They can also act as the micro agents for selling rural business across India.
  28. In the recent insurance programme of our prime Minister: Pradhan Mantri Jan Dhan Yojana (PMJDY), Banking correspondence are being used for banking services and they also can be utilized as our micro agents for cattle business.
  29. It is also suggested that UIIC can use the funds under Corporate Social Responsibility (CSR) for various rural development and cattle breeding and health checkups in rural areas through collaboration with various Agriculture Research Institutions and Rural development centers like SERP in Andhra Pradesh, MITRA in Maharashtra, BAIF Institute for Rural Development (BIRD) which is a subsidiary of BAIF located in 16 states in India. The field workers of these institutions can also be appointed as Micro agents for rural business.
  30. In most of the rural areas, there are mini markets selling FMGC products at prominent junctions on the State and National Highways. These markets are now

growing at much faster rates in rural areas. The salesmen of these mini markets can also be used as micro agents.

31. Another major financial institution becoming popular in rural areas are the Micro Finance Institutions and Self Help Groups (SHG) can also be considered for tapping rural and cattle business.
  32. There are around (on average) 300 Multi-Purpose Agriculture credit co-operative societies affiliated to District Center Cooperative Banks (DCCB) in each districts of every states. They are being financed by NABARD for various agriculture and rural development activities like purchase of tractors, diary animals, crop loan, fertilizers, insecticide, motor pump sets, etc. The agriculture officers appointed by NABARD supervises these financial activities. The secretaries or officials of these agriculture credit societies can be utilized for rural and cattle business.
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