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STATUS OF BOVINE DISEASES IN INDIA – A REVIEW

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Abstract

The livestock industry success depends on health of the livestock and any compromise on health ground will shatter the hope of livestock sector. Various programmes launched by Government of India and other organizations to improve breeding, feeding and health status etc. have brought positive change in production and productivity in the country many fold but susceptibility to various diseases including exotic diseases has increased. Out of four pillars of animal husbandry i.e. breeding, feeding, management and disease control, the disease control is more important and most critical factor to make the livestock sector economically viable. To reduce the economic loss, the livestock sector should stand with reduction in cost of production to disease free production. The best example of this is failure of crossbreeding program in the country as crossbred cows were more prone to different diseases than our native breeds.

Key words: Morbidity rate, Mortality rate, Incidence, Breeds,

1) INTRODUCTION

India possesses largest livestock and poultry population, which play a vital role in improving the socio-economic conditions of rural masses. India, with enormous genetic variability reflected by almost 30 breeds of cattle, 10 breeds of buffaloes (Sadana and Jain, 2002), 44 breeds of sheep and 23 breeds of Goat. India ranks first in respect of buffalo, (55.94% of world population-188.3 million), second in cattle, (14.40 % of world population-1382.2 million), second in goats (16.19 % of world population-868 million), third in sheep (6.67 % of world population -1071.3 million**).** India has 529.71 million Livestock's including 199.08 million cattle population, 105.34 million buffalo's population, 140.54 million goat population & 71.56 million sheep population.

Livestock are Centre to the livelihood of rural poor in developing countries by at least nine ways 1) Important source of cash income, 2) One of few assets available to rural poor (Especially poor woman), 3) Manure and draught power use to preserve fertility of soil and intensification of farming system in developing countries facing increasing population density, 4) Allow poor to exploit common property resources (open grazing land), 5) Enables farmers to diversify incomes so help to reduce income variability, 6) Provides vital and only source of income for poorest and most marginal of rural poor such as pastoral, sharecroppers and widows, 7) Works as a financial cushion for agriculture 8) Provides employment throughout the year, 9) Generalization of income without time lag.

The main sources of milk production in country are Cattle and Buffalo so we have to put major emphasis on the health of these animals so that disease free milk could be produced in the country in better hygienic condition to stand the international market. The poor management practices adopted by most of the dairy farmers, in turn, are dictated in poor calf survivability as well as increased neonatal susceptibility to various conditions like Diarrhoea and Pneumonia. This ultimately will result into poor replacement of breedable stock and hence, will adversely affect the continuity and profitability of dairy farms. The future of any dairy farms depends on the successful raising of dairy calves especially heifers as replacement stock. A dynamic and good dairy herd should have regular annual female replacement up to 20%, as the average herd life of productive cows is expected to be 6-8 years (Jana and Nautiyal, 1993).

The knowledge of prevalent diseases and causes of mortality are very important for managing dairy farms efficiently. This will ensure constant profitability and also will assist in maintaining constant and desirable herd strength throughout the year too. Therefore, studies

on cause specific mortality need immediate attention for accurate planning and successful execution of breeding plans and livestock improvement programmes. Moreover, identification of individual risk factors for mortality needs immediate attention. This will assist in getting regular and time bound replacement of herd, and also will help in maintaining a constant ratio of milch to dry females (70:30) in a herd.

2) COMMONLY USED STATISTICAL METHODS FOR ESTIMATION OF MORBIDITY AND MORTALITY:

There were many statistical methods employed by various workers to analyze the morbidity and mortality rates and factors affecting them.

Kulkarni *et al.* (1989) analyzed mortality rates by using t- test. Prasad *et al.* (2004) determine the association of relation between breed, year, and season cause of death with mortality rates by using chi- square test. Similar test was employed by Kumar *et al.* (2002).

Analysis of Variance was vastly employed method to determine the influence of age, sex, season on mortality pattern. Kulkarni *et al.* (2000) used angular transformation of mortality rates for Analysis of Variance.

Normal deviate (z) test was employed by Kumar *et al.* (2002) to determine the significant difference between various groups of cattle. While many workers reported the frequencies of the mortality and morbidity rates according to age, sex, breed, season and other factors (Dana *et al.*, 2001, Chavai *et al.*, 1999). Another statistical metods used are Logistic regression (Khalate N. 2009, Shaikh S. R. 2009**,** Sundaram M, 2010, Andres Aland 2003, Wittum *et al.*, 1994). Cox Proportional hazard model was used by Wudu *et al.*, 2008.

Khalate & Shaikh (2009), Sundram (2010) and Bangar (2011) analysed morbidity & mortality by using chi square & logistic regression.

3) INCIDENCE AND PREVALENCE OF LIVESTOCK DISEASES:

Incidence is the number of new cases that occur in known population during a specific time period and Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time.

Lalrintluanga *et al.* (2003) examined a total of 987 udder quarters from 248 cows and screened for mastitis using a modified California mastitis test (MCMT) reagent in Aizawl, Mizoram, India from April to December 2001. Cows aged 4-6 years were the most commonly affected (51.10%). Mastitis incidence was higher during the early stage of the third lactation (36.60%), single quarter infection was recorded more frequently (63.44%) and the left hind quarters were more frequently affected (30.25%).

Hasan *et al.* (2007) studied the prevalence of mastitis and black quarter in crossbred and local indigenous cattle and found that Cross bred cows (58.33%) were more susceptible to mastitis than local cows (41.67%). Older cows (Age: 5-8 years) were more affected and the percentage of infection is higher in older cow (66.67%) than the younger cow (33.33%). Cross bred cattle were recorded higher (64.8%) infection of black quarter than that of local cattle (35.72%). Male animal affected more in black quarter than female animal and young (71.42%) cattle were more susceptible than older (28.58%) cattle.

Aulakh *et al.* (2008) studied the epidemiology of brucellosis in Punjab (India). The overall apparent prevalence of brucellosis was found to be 18.26% (true prevalence - 17.68%). The disease prevalence was found to be non-significantly higher (chi square 1.029, $p = 0.310$) in cattle (20.67%) compared to buffaloes (16.41%) and increased with age (chi square = 8.572, $p < 0.05$) in both species. There was significant association between disease and abortion (chi square = 22.322, $p < 0.01$) and maximum abortion cases due to brucellosis were found in > 6 month of gestation (95.7%). The disease was significantly associated with the retention of placenta (chi square = 8.477, $p < 0.01$), however there was no significant relationship of the disease with repeat breeding (chi square = 0.044, $p = 0.834$).

4) MORBIDITY RATE:

It is number of the individuals which develops the illness (disease) during the given period of time divided by the total number of the individuals present at mid period time. The morbidity rates provide us the proportion of the individuals falls ill (infected with the disease) in the population for the given time of period.

Singh *et al.* (2005) conducted study at the organized farms situated in two different ago-climatic conditions of Uttar Pradesh situated at Bareilly and Allahabad and found that the overall morbidity was 0.71 and 1.75% per year respectively. Gitau *et al.* (1994) reported crude morbidity rate in the live born calves as 26.6% in a study carried out at the dairy farms in the Kiambu district of Kenya.

Singh *et al.* (2006) conducted study on an outbreak of buffalo pox in buffalo dairy herds in November 2003 on the outskirts of the Aurangabad district of Maharashtra in India. The outbreak occurred in ten herds containing buffaloes of mixed ages and of predominantly the Jafarabadi breed and the Jafarabadi-Surti crossbreed of domestic buffalo. The farms were individually owned with a total population of animals at risk of approximately 400. The overall morbidity reached 45% (total of 180 of the 400 buffaloes). Approximately 80% of the

affected buffaloes (which were aged between 6 and 12 years) were Jafarabadi and Jafarabadi-Surti dairy animals.

Meena *et al.* (2006) reported that in Nanital district Uttrakhand, the data on morbidity and mortality form infectious (Diarrohea, Mastitis, HS, FMD, Pox, PPR etc.) and parasitic diseases accounted to more than 60% and it contributed to significant economic loss to the livestock farmers, and similar observations were also made by Jithendran and Bhat (1999) in Himachal Pradesh. Chauhan *et al.* (1994) also reported that maximum loss to the dairy animals is due to bacterial diseases followed by parasitic diseases .The contribution form reproductive disorders and respiratory diseases was not the least (26.7%) . Thus the principal cause of death were infectious diseases like Diarrhea, Pneumonia, HS, FMD, Pox, PPR etc. (30%), reproductive and other associated problems (difficulty in parturition, abortions, retained placenta, metritis etc., 24.7%), snake bite (16.3%), accidents (12.0), wild animal hazards (9%) and others (Hematuria and some unknown etiology).

Singh and Prasad (2008) reported on the basis of average figures of last 15 years (1991-2005) from annual reports of the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India, reported that four diseases (FMD, HS, BQ & Anthrax) accounted about 56.6% incidence and 84.4% deaths to total incidence and deaths due to all diseases in cattle respectively. FMD had high morbidity (45.3% incidence) but low mortality (16.6% deaths) and was highly contagious. HS accounted for 9% incidence and 44% of the aggregate of deaths.

5) MORTALITY RATE:

It is the number of the individuals died in given period time divided by the total number of individuals present. This provides the measure to determine the proportion of the individuals died during the given period.

Palanivel *et al.* (2007) carried out a retrospective study on the mortality pattern in 24 veterinary hospitals of 9 districts and 2250 farmers holding farm in Tamilnadu for the period April 1999 – March 2001 and reported the calf mortality of 11.75% during the study period [26].

Khalate (2009) reported the overall mortality on two organised farms of Maharashtra was 7.88% and mortality rate of 8.71% and 6.42% was recorded at RCDP, Rahuri farm and ICF, Akola farm respectively during 2009. The overall mortality rate in calves from 0-6 month was 27.27% at RCDP, Rahuri and 10.29% at ICF, Akola.

Sundram (2010) reported an overall mortality rate of 14.48% in cattle in Cauvery delta region during the year 2009. The PMR (Proportional Mortality rate) was highest in 0-1 year age group followed by 5-8 years age group compared to other age groups in each of four districts and the whole region. The highest PMR was observed during 3-6 months (22.89%) and 6-12 months age groups (22.69%) followed by 30-60 days (16.81%) and 60-90 days age groups (14.29%) in less than one year population.

Bangar Y, *et al* (2013), reported in Pune division of Maharashtra that morbidity and mortality rates in cattle were 22.24% & 4.42%, respectively. Reproductive (7.09%) and digestive (5.14%) diseases were major causes of morbidity in the study area. Adult cattle showed high (28.97%) morbidity due to reproductive problems which are major challenges under village conditions in study area. Digestive (1.43%) and nutritional (0.85%) diseases were major causes of mortality of cattle. Highest mortality rate (16.81%) were observed among calves and male were at higher (17.86%) mortality risk than that of female.

Chaudhary J.K. *et al*. (2013) reported in Himachal Pradesh that the morbidity rate in bovine was 31.22%. Among the three age groups, adults' bovine showed highest morbidity rate 35.73%, followed by calves 26.98% and young stocks 23.17%. Among the three age groups, calves had highest morbidity rate 16.09% due to poor management problems followed by adults 12.15% cases of reproductive problems. The overall mortality rate in bovine was found 9.14%. The overall analysis of mortality in bovine with respect to age revealed significance ($p<0.01$) difference between age and sex. Amongst the three age groups, calves showed highest mortality 21.53% followed by young stocks 9.35% and adults 4.73%. Among the three age groups, calves had highest mortality (16.09%) due to poor management problems followed by 2.48% cases of digestive diseases.

6) FACTORS AFFECTING THE MORBIDITY AND MORTALITY:

6.1) AGE:

Age is the important factor which affects the morbidity and mortality in the cattle and buffalo. Some workers reported comparatively higher risk during early ages (Dana *et al.*,2001 Kulkarni *et al.*, 2001) while others reported high risk in older ages (Gitau *et al.*,1994).

Sevensson *et al.* (2006) reported highest probability of occurrence of mortality was in the first 3 weeks of life in Swedish dairy calves and dairy heifers. The median herd level mortality risk for calves was 2.1% (range from 0.0- 4.3). Sivula *et al.* (1996) investigated calf mortality in 30 dairy herds in the southwest Minnesota and reported that the calves up to age

2 weeks were at the higher risk of the mortality, Hutgren *et al.* (2008) found that the incidence rate was higher for the period from conception to calving.

6.2) SEX:

Sex is another influential factor having impact on the mortality and morbidity.

Rathore *et al.* (1998) carried epidemiological study on buffalo morbidity and mortality based on four year observations on 18 630 buffaloes maintained at 28 livestock farms in India and found that death rate was higher in males than in females in all age groups except in adults.

Kumar *et al.* (2002) carried study on calf mortality pattern in relation to age and sex in organized livestock farms in Andhra Pradesh and reported death rate in male calves (4.18%) was slightly higher than that in female calves (4.08%) and sex of calf had highly significant effect on calf mortality in buffaloes.

6.3) BREED / GENETIC GROUP:

The morbidity and mortality patterns are also influenced by the breed or genetic group of the animal.

Kulkarni *et al.* (1989) showed that mortality averaged about 34.09% in Gir, 8.62% in Holstein × Gir crosses, 17.52% in Jersey × Holstein crosses, 15.37% in Holstein × (Jersey × Gir) crosses, 20.51% in Jersey × (Holstein × Gir) crosses and 26.20% in BS × (Holstein × Gir) crosses of cattle. Srivastava *et al.* (1992) conducted study in Uttar Pradesh and found significant variation in mortality among cow calves of different breeds. They reported mortality rate of 15.59% in Hariana followed by Sahiwal (11.92%), Sindhi (3.45%) and Tharparkar (2.68%) cow calves up to one year of age. They reported a range of mortality rate from 6.27% to 40.22% in Hariana calves and 10.62% to 34.09% in Sahiwal calves in different farms. Jana *et al.* (1997) reported that different breed groups showed different mortality rates, but chi-square analysis revealed non-significant difference at 5% probability level ($p>0.05$).

Rathore *et al.* (1998) found that the mortality rate was 5.27% in Murrah breed, 10.50% in Surti and 15.62% in crossbreeds which studied in 18 630 buffaloes from 28 livestock farms in 14 states of India between 1987 and 1991.

Khatun *et al.* (2009) carried out on three breeds of buffalo in a buffalo breeding and development farm. There were three types of buffalo such as Nili-Ravi, Indigenous and their crosses were reared. One hundred thirty one dead calves were studied for mortality. Pure Nili-Ravi showed higher mortality rate. The highest life span of dead calves was found as 717 days in Nili-Ravi and lowest 1 day in all breeds. The effect of breed on the life span of dead

calves was insignificant ($p>0.05$). Furthermore, female calves are more prone to death as compared to male counterpart.

6.4) SEASON:

There are evidences which indicate the seasonal effects on mortality and morbidity.

Jindal *et al.* (2002) carried study on analysis of 26 recorded outbreaks of hemorrhagic septicemia (HS) in buffalo and cattle in various districts of Haryana, India from July 1995 to June 1999 and found that the outbreaks occurred more often during winter than during the rainy and summer seasons (15, 6 and 5 outbreaks, respectively).

Kumar *et al.* (2002) observed in buffalo calves, the highest mortality in calves born in summer (20.83%), followed by those born in winter (14.09%), rainy season (14.07%), and autumn (12.42%). Shaikh (2009) reported that morbidity rate in cattle in summer, rainy and winter season was 23.51%, 47.59%, 28.89 respectively.

Palanivel (2007) reported higher mortality during monsoon due to high environmental stress. Singh *et al.* (2005) reported highest incidence of mortality during the environmental stress. Chavai *et al.* (1999) reported high mortality in rainy season and approximately same rate for winter and summer season but found that the season did not influence the mortality rates in cattle. Santra *et al.* (1996) reported that occurrence of the pneumonia was more in the rainy season.

Environmental risk factors associated with disease of digestive track include season and temperature of cow house. The mortality rates among cattle were significantly higher in the winter and spring (Andres Aland, 2003). Singh *et al.* (2005) reported the higher occurrence of the skin disease was in the hot and humid environmental condition. Prasad *et al.* (2004) investigated the mortality pattern in the crossbreed animals in the organized farm in Karnal and observed that the high mortality in the cold seasons in indigenous breeds, while higher mortality at hot and humid condition in crossbred calves.

7) DISEASE SPECIFIC MORBIDITY AND MORTALITY:

The mortality and morbidity rates are varying with cause of the disease and have influence on the occurrence of the disease, so it become necessary to analyze the disease specific morbidity and mortality.

7.1) DIARRHOEA:

Diarrhoea is the major cause of the calf mortality in the early ages (Santra *et al.*, 1996). Digestive problems were most frequently reported in the cattle and buffaloes (Akhtar *et al.*, 1994).

Rathore *et al.* (1998) carried study on Morbidity and mortality were studied in 18 630 buffaloes from 28 livestock farms in 14 states of India between 1987 and 1991 and they reported that 1728 total deaths and highest deaths (33.62%)were due to digestive disorders.

Prasad *et al.* (2004) investigated mortality rates in the various breeds of cattle in Karnal and they reported that the major cause of the mortality of cattle irrespective of the breed and age group was digestive disorders. Sivula *et al.* (1996) reported the median morbidity due to enteritis was 0.1 cases per 100 calf days at risk which ranged from 0.0 to 0.7 cases per 100 calf days.

Zaman *et al.* (2006) reported that Neonatal calf diarrhea (NCD) rendered the highest morbidity (16.6%) and mortality (5.2%), it was followed by pneumonia (12%), enteritis with pneumonia (9.3%), omphalitis (3.4%) and hepatitis (2.5%). Bhullar *et al* (1985) reported commonest cause of death was enteritis (63%) in study of mortality among buffalo-calves.

7.2) PNEUMONIA/ RESPIRATORY DISEASES:

The second major reason for the death of bovine is pneumonia or respiratory diseases.

Patil *et al.* (1992) carried study involving 4035 Surti buffalo calves (1773 male) over a 10-year period (1980-90), mortality up to 12 months of age was recorded and in that study enteritis accounted for 39.29% of the deaths, pneumonia for 24.94%, and pneumoenteritis for 12.59%.

Gitau *et al.* (1994) reported morbidity rate of 3.3 % for the first year of life due to pneumonia in small dairy herds in Kenya.

Santra *et al.* (1996) reported that the mortality due to pneumonia was higher in male calves than those female calves. Chavai *et al.* (1999) reported that the 30 deaths out of 118 deaths occurred in the Kolhapur Agriculture College Dairy farms were due to pneumonia. Pan *et al.* (1996), Somvanshi *et al.* (1995) and Singh (2000) reported that the pneumonia was one of the major causes of mortality in village animals.

Prasad *et al.* (2004) reported that 3.76% of cattle irrespective of the breeds died due to the major respiratory diseases. Palanivel *et al.* (2007) reported that overall mortality due to respiratory disease was 11% in Tamilnadu.

7.3) SPECIFIC DISEASES:

Morbidity and mortality in the bovines at village level is also caused by the particular diseases viz; Foot and Mouth disease, Hemorrhagic Septicemia, Black Quarter, Anthrax, Protozoan disease etc.

Rathore *et al.* (1998) carried out epidemiological study on buffalo morbidity and mortality based on four year observations on 18630 buffaloes maintained at 28 livestock farms in India and they found that annual mortality an average of 7.45% and Enteritis and hepatitis were the commonest diseases and Ketosis, rickets, hypovitaminosis A and hypoproteinaemia were the commonest metabolic disorders.

Jithendran *et al.* (1998) carried out study in the Himalayan regions on animal husbandry practices and they found that heavy parasitism was one of the major problems of the region in livestock. Fasciolosis was identified as one of the most important parasitic diseases of the livestock in the area with 62% infected cattle and buffaloes out of 227 animals examined. Most of the deaths were reported to be due to various diseases followed by accidental poisonings by ingestion of toxic plants or accidents. Seasonal outbreaks of diseases like FMD, has been reported by the farmers. Problems associated with migratory animals were mainly the lack of pasture land, abortions, infectious diseases and lack of veterinary inputs at higher reaches.

Krishnapa *et al.* (2002) reported that the overall incidence of the Trypanosomiasis in Karnataka state was 42.2%.

Jindal *et al.* (2002) carried out analysis of 26 recorded outbreaks of Hemorrhagic Septicemia (HS) in buffalo and cattle in various districts of Haryana, India from July 1995 to June 1999 and reported that disease prevalence was higher in buffalo than in cattle (23 vs. 1 outbreaks) and the morbidity, cumulative mortality and case fatality rates were 2.44, 0.68, and 27.75%, respectively.

Singh *et al.* (2006) recorded an outbreak of buffalo pox in domestic buffaloes, with high morbidity and significant production loss in the Aurangabad district of Maharashtra State in India in November 2003.

7.4) MISCELLANEOUS CAUSES:

Along with above mentioned diseases there are many other causes which are responsible for the morbidity and mortality of the bovines. Larson *et al.* (1998) reported that the 50% of the deaths of calves were caused by dystocia while remaining calf deaths within 10 days after are due to infectious diseases.

Some other causes for the morbidity and mortality were debility, pyrexia, skin diseases (Wittum *et al.*, 1994). Rajeev Singh *et al.* (2005) reported the proportional mortality rate of 4% for coli septicemia, 3.5% toxemia, 2.5% join ill in the Allahabad and Bareilly Dairy farms. Debnath *et al.* (1990) reported a morbidity of 20.63%, 5.05% and 4.14% for skin diseases, pyrexia, and specific infectious diseases respectively.

Singh and Prasad (2008) reported that The overall order with respect to the number of incidences as: PPR > FMD > sheep and goat pox > CCP > Fasciolosis / distomatosis > enterotoxaemia > anthrax. The corresponding ranking order with respect to number of deaths was: PPR > sheep and goat pox > enterotoxaemia > CCP > anthrax > Fasciolosis / distomatosis > FMD.

Bilal *et al.* (2009) conducted study on 160 calves (80 of each buffalo and cow) calves in rural areas of Toba Tek Singh, Pakistan and they reported that 75% buffalo and 56.25% cow calves were positive for worm infestation. The highest prevalence of nematodes was recorded followed by mixed infection and cestodes, and no calf was found positive for trematodes. Buffalo and cow calves between 1 to 6 months of age exhibited highest prevalence (86.67, 69.05%) compared to the age group of 7 to 12 months (60, 42.10%). Calves on grazing were heavily infected (83.33% buffalo calves, 75% cow calves) than those of stall fed (70% buffalo calves, 46.16% cow calves). Buffalo male calves were more affected (88.38%) than female calves (59.46%) whereas, the same was for cow calves.

8) DISEASES AFFECTING ANIMAL PRODUCTIVITY:

Dhakal *et al.* (2002) conducted study on Economic impact of clinical mastitis in the buffaloes in Nepal) to determine the prevalence of clinical mastitis in buffaloes. In this study, 46% of the buffaloes were found affected with clinical mastitis and first lactation buffaloes were mostly affected with clinical mastitis in comparison to other lactations. Buffaloes with first two months of lactations were mostly affected and milk loss was 11% of the average total lactation yield.

Saxena *et al.* (2002) conducted study on Disease prevalence and productivity losses in bovines and they reported that reproductive disorders (anoestrus and repeat breeding) and

diarrhoea and rheumatic syndrome were the main diseases for cattle and buffaloes. Buffaloes were more disease-prone than cattle. Disease prevalence rates (DPR) for anoestrus was 14 and 18% in cattle and buffaloes, respectively, and repeat breeding was 1-4% for both species. Milk production losses were lower in pregnant animals for both species, with slightly higher losses in buffaloes. Repeat breeding, anoestrus and mastitis (pregnant buffaloes only) led to 690, 530 and 85 g losses in daily milk yield, respectively.

9) CONCLUSIONS:

Among the domestic animals bovines are the backbone of national economy as they provide milk, meat, draft power and valuable supplementary income of millions of house hold. The morbidity and mortality caused by different diseases in bovines are major challenges to livestock industry. Major causes of morbidity in bovine are reproductive diseases. The majority of infections in bovines occur in rainy season. The calves are found at more risk of mortality in bovine and the probability getting disease reduces with increase in age. Mortality rate is high in bovine calves due to poor management problems and the male were at higher risk of morbidity and mortality as compared to female.

AUTHOR'S CONTRIBUTION:

JKC and BS designed the study. JKC conducted the study and analyses the data. BB, SK, AV and VK drafted and revised the manuscript. All authors read and approved the final manuscript.

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