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Epidemiological Measures of Disease Frequency Against Sheep Pox

Veterinary Science

KEYWORDS : Sheep pox, Active and passive surveillances, Disease frequency, Predisposition

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ABSTRACT

Sheep pox is one of the major viral diseases of sheep; it cause serious socio-economic or public health consequences, and is of major importance in the international trade of animals and animal products. An epidemiological study was undertaken to assess the crude and specific measures of morbidity, mortality and case fatality against sheep pox. In this study, a total of 15 sheep pox outbreaks were selected by active and passive surveillances in north-west agroclimatic zone of Tamil Nadu, India. Overall morbidity, mortality and case fatality rates were 7.20%, 2.42% and 33.57% respectively. Morbidity, mortality and case fatality rates were higher in young than adult animals. Morbidity, mortality and case fatality rates were higher in Trichy black than Mecheri breed and Non-descriptor. Disease frequency was higher in females than males. The present study concludes significant age, breed and sex predisposing exist in the outbreaks of sheep pox.

INTRODUCTION

Sheep pox is a highly contagious, host specific viral infection and causes high rate of morbidity and mortality in sheep (Singh et al., 2007). Sheep pox is enzootic in India, and several outbreaks have been reported regularly from almost all the states (Raina et al., 2003; Bhanuprakash et al., 2005), including Tamil Nadu (Sathe, 1931-1932). Tamil Nadu has a sheep population of more than 79.91 lakhs (Basic Animal Husbandry Statistic, 2010) which is mainly reared by small and marginal farmers and land less labourers and act as an important source of family income and are known as the 'moving banks' of shepherds (Bhanuprakash et al., 2006). Huge economic losses emanating from the disease outbreaks are the results of the wool and hide damage, subsequent production losses and also the morbidities and mortalities associated with the disease (Verma et al., 2011). The estimated annual loss due to the sheep pox is Rs. 4,792 per flock (Senthilkumar and Thirunavukkarasu, 2010) and this shows that sheep pox outbreaks are regular feature in this state. Factors like, host (age, sex, breed, nutritional and immunological status), agent (strain, virulence, pathogenicity), environment (micro and macro), poor management, feed scarcity and inadequate veterinary services have direct influence on the epizootiology of sheep pox (Woldemeskel and Ashenafi, 2003). Hence, the present study was aimed to assess the crude and specific measures of disease frequency against sheep pox in north-west agroclimatic zone of Tamil Nadu.

MATERIALS AND METHODS

Study zone

Tamil Nadu is divided into seven agroclimatic zones viz., Cauvery delta, North-east, West, North-west, High altitude, South and high rainfall zones. The study was carried out in the North-west agroclimatic zone, primarily comprising Namakkal, Salem, Dharmapuri and Krishnagiri districts and situated between 11 and 12º55' north latitude and 77º28' and 78º50' east longitude with mean annual rainfall of 877.6 mm.

Outbreak data

Sheep pox outbreak particulars in the study zone were collected by both active and passive surveillances as per protocol prescribed by Martin et al. (1994). A total of one and fourteen outbreaks were identified by active and passive surveillances respectively for a period of twelve years (June 1997 to May 2009) and used in this study. Out of 5962 animals under the risk, 429 and 144 were affected and died respectively. Categorization of animals under age, breed and sex are shown in table 1.

Analysis of data

Crude measures are an expression of the amount of disease and death in a population as whole; they take no account of the structure of the population affected. Crude and specific rates of morbidity, mortality and case fatality were calculated as per the method followed by Bhanuprakash et al. (2005).

$$\text{Morbidity rate} = \frac{\text{Number of sheep showing signs of sheep pox}}{\text{Total number of susceptible sheep under risk}} \times 100$$

$$\text{Mortality rate} = \frac{\text{Number of sheep died due to sheep pox}}{\text{Total number of susceptible sheep under risk}} \times 100$$

$$\text{Case fatality rate} = \frac{\text{Number of sheep died due to sheep pox}}{\text{Total number of sheep showing signs of sheep pox under the study}} \times 100$$

RESULTS AND DISCUSSION

Crude measure

Overall morbidity, mortality and case fatality rates were 7.20%, 2.42% and 33.57%, respectively. In this study zone, observed rate of overall morbidity is very low when compared with report of Senthilkumar et al. (2006) who reported overall morbidity in Dharmapuri district of Tamil Nadu was 28.76%. But, Woldemeskel and Ashenafi (2003) reported that the morbidity rate may be as low as one percent and go up to cent percent in newly imported and highly susceptible flocks. Observed rate of mortality concurred with the earlier report of Govindarajan et al. (2005) who reported that the overall mortality was 3.44% in Kancheepuram district of Tamil Nadu, India. Observed overall case fatality rate is high when compared with report of Govindarajan et al. (2005) and very low when compared with report of Senthilkumar et al. (2006) who reported the overall case fatality rates were 12.50% and 77.17% respectively. In the present study, varying degree of disease frequency might be due to influence of host, agent and environmental determinants and husbandry practices associated with the outbreak of sheep pox as suggested by Woldemeskel and Ashenafi (2003).

Specific measures

Host factors responsible for outbreak of sheep pox could in-

clude age, sex, breed and physiological, nutritional and immunological status (Prasad et al., 1995; Rao et al., 1994). Specific measures of disease are those that describe disease occurrence in specific categories of the population related to host attributes such as age, sex, breed and method of husbandry, etc. They convey more information than crude measures on the pattern of disease and categories of animal that are particularly at risk of disease (Thrusfield, 2007). Specific measures of morbidity, mortality and case fatality are shown in the table 1.

Age specific measure

Morbidity, mortality and case fatality rates were 22.70%, 8.85% and 38.97% in young and 4.59%, 1.33% and 29.06% in adult respectively. In this study, significant difference ($p<0.01$) in disease frequency was observed between young and adult animals. Similarly, several authors Mariner et al. (1991) and Yashpal et al. (1997) reported higher level of disease frequency in young than adult animals.

Breed specific measure

Morbidity, mortality and case fatality rates were 15.72%, 6.24% and 39.68% in Trichy Black, 2.75%, 0.85% and 31.07% in Mecheri and 12.34%, 2.19% and 17.72% in Non-descriptor breeds of sheep respectively. In this study, significant difference ($p<0.01$) in breed predisposition was observed. This is in accordance the findings of Senthilkumar et al. (2006) who found that higher rate of disease frequency in Trichy black breed than Mandya and Mecheri breeds. Mullick (1988), Mondal et al. (2004) and Roy et al. (2008) also observed the breed predisposition in the sheep pox outbreak.

Sex specific measure

Morbidity, mortality and case fatality rates were 16.53%, 3.24% and 19.66% in male and 5.94%, 2.30% and 38.78% in female sheep respectively. Similarly, Murthy and Singh (1971) and Senthilkumar et al. (2006) reported higher disease frequency in females than males. Higher frequency in females might be due to physiological stress associated with pregnancy and lactation as stated by Elshafie and Ali (2008).

CONCLUSION

Specific measures indicate that significant age, breed and sex predisposing exist in the outbreak of sheep pox. It is important to consider the above factors when attempting prevention, control and eradication of the disease.

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Table 1. Categorization of animals and specific measures of morbidity, mortality and case fatality rates of sheep pox

Specific measure	Categories	No. at risk	No. affected	No. died	Morbidity rate (%)	Mortality rate (%)	Case fatality rate (%)
Age	Young(< 1 year)	859	195	76	22.70	8.85	38.97
	Adult(> 1 years)	5103	234	68	4.59	1.33	29.06
Breed	Trichy Black	1571	247	98	15.72	6.24	39.68
	Mecheri	3751	103	32	2.75	0.85	31.07
	Non-descriptor	640	79	14	12.34	2.19	17.72
Sex	Male	708	117	23	16.53	3.24	19.66
	Female	5254	312	121	5.94	2.30	38.78

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