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Research Note

Economic Implications of *Peste des petits ruminants* (PPR) Disease in Sheep and Goats: A Sample Analysis of District Pune, Maharastra[1]

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Abstract

The paper has reported a cross-sectional sample survey conducted across six villages severely affected by *peste des petits ruminants* disease to assess the nature and extent of loss in small ruminants. The study is based on the data pertaining to disease incidence, production losses, costs incurred and impact on farm productivity collected though personal interview method. The incidence and mortality rate have been found slightly higher in sheep than goats. The total losses due to disease have been found to range between Rs 918 in sheep to Rs 945 in goats. Reduction in the market value of animals has been recorded as the major loss component as appearance of the animal changes drastically after the illness, costing Rs. 404 (44 %) in sheep and Rs 408 (43%) in goat. It is followed by losses in production yield. Expenditure on medicine and infertility has been found to cause more than 80 per cent of the total cost, followed by veterinary and labour services. The study has suggested that timely vaccination could be the best and low-cost preventive measure to control such deadly disease outbreaks.

Introduction

Peste des petits ruminants (PPR) is an acute febrile viral disease of small ruminants, characterized by mucopurulent nasal and ocular discharges, necrotising and erosive stomatitis, enteritis and pneumonia (Singh *et al.*, 2004). The disease is endemic in India and causes major economic losses due to the high rates of mortality and morbidity in infected domestic animals of sheep and goats. It causes death in more than 50 per cent of the affected animals due to high fever, pneumonia, diarrhoea and dehydration. Several outbreaks have been reported regularly from almost all states, including Maharastra, which is one of the major sheep and goat rearing states in India. Maharastra has 10.68 million goat and 3.07 million sheep population (Census, 2003), mainly reared by small and marginal farmers. These small domestic animals are the important source of family income and are known as the 'moving banks' of shepherds. However, this income is often reduced by various infectious diseases, including *peste des petits ruminants*. Hence, the estimation of economic implications, carried out in this paper, is important not only for a description of the actual situation, but also for how much and to what extent the losses can be avoided and risk of disease can be diminished.

Material and Methods

The study was conducted in the Pune district of Maharastra, where maximum outbreaks and deaths were reported during 2005-06 (DIS, Maharastra, 2007). Complete enumeration of villages in Baramati and Daund block, where outbreaks were reported, was made. A cross-sectional survey of sheep and goat producers was done to assess the nature, extent and impact of disease across randomly selected six villages. To study the nature of disease in different spatial

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locations, ten farmers each from the selected villages were contacted for the study. Thus, a total of sixty farm households constituted the sample from whom the data were collected for analysis. A questionnaire was used to collect information on flock size and structure, sources of income and costs, disease outbreaks and impacts on farm productivity. Further, data on movement of the animals and farm products, persons employed in the farm, feeding and watering habits, and source of grazing were also collected. The collected data were tabulated, classified and further categorized for systematic and suitable statistical analysis.

Result and Discussions

Social Attributes of Respondents

The farm animals in the study area are mainly managed by nomadic tribes, who have wandering traditions, in the absence of any means of survival and lack of education to fit into the settled society. They are left away from the mainstream and fossilized in poverty, superstition and ignorance. They have remained backward economically and socially. They manage and graze their own animals as well as farmer's farm animals of other villagers on payment (wage) basis. It was found that 96.66 percent of sheep and goat farmers belonged to this community, as it is the lineal occupation of *Dhangar* caste in the state. No specific housing system was available for sheep and goat and grazing on public lands was the common practice among 95 per cent households. It was also noted that the majority of respondents were illiterate (76.67 per cent), followed by some 22 per cent) with primary level education.

Status of *Peste des petits ruminants* Disease

Regular outbreaks of *peste des petits ruminants* were reported in the state and the incidence and death cases were increasing day-by-day. Information on the outbreak, attack and death of animal during the past five years has been presented in Table 1. In 2005-06, heavy loss in the form of animal death was recorded and over 95 per cent loss was in the Pune districted of the state. This was the main reason to select this area for study.

Table 1. Status of *Peste des petits ruminants* disease outbreak in Maharastra

Year	Number of		
	Outbreaks	Attacks	Deaths
2001-02	9	372	140
2002-03	23	1192	332
2003-04	35	1065	167
2004-05	14	602	349
2005-06	28	19367	4515
Pune district	**12**	**18389**	**4303**

Source: Surveillance Report (2007), Western Regional Disease Investigation Section, Pune, Maharashtra

Incidence Rate: It is the number of new cases of a disease occurring in a specified population, divided by the average number of individuals in that population during that specified time period. It is a way of measuring the risk that a susceptible individual in a population has chances of contracting a disease during the period.

It could be observed from Table 2 that infection rate was slightly higher in sheep (52.99%) than goat (51.47%). Since high severity of the disease was reported for the first time in the study area, all sheep and goats were vaccinated only after the outbreak of disease.

Table 2. Incidence rate of PPR in sheep and goat

Species		Animal infected in the farm	Total animals in the farm	Infection rate, %
Sheep	Total	3187	6014	
	Average	55.91	105.51	52.99
Goat	Total	175	340	
	Average	6.73	13.08	51.47

Mortality Rates: It measures the proportion of animals dying in a population. The mortality rate due to *peste des petits ruminants* disease was found to be 13.50 per cent in sheep and 8.53 per cent in goat (Table 3). Mortality rate was high due to delay in diagnosis of disease and insufficient veterinary services and availability of doctors during the outbreak period, as revealed by the respondents. The incidence of mortality as reported by Hossain *et al.* (1996), was much higher at 46 per cent in Bangladesh.

Table 3. Mortality rate of sheep and goats

Species		Animal infected in the farm	Total animals in the farm	Mortality rate, %
Sheep	Total	812	6014	13.50
	Average	14.25	105.51	
Goat	Total	29	340	8.53
	Average	1.12	13.08	

Losses due to *Peste des petits ruminants* Disease

For estimating the production losses due to disease, average meat price, weight reduction during the outbreak, number of days of illness, reduction in the market value, reduced price due to abortion and reduction in the quality of wool/hairs were analyzed. Loss due to the production yield was estimated by multiplying the reduction in weight (chevan and mutton) during the outbreak by the average price of the chevan and mutton.

The total loss due to the disease was worked out to be of Rs 918 in sheep and of Rs 945 in goats (Table 4). The major part of the loss was due to the reduction in the market value of the animal after the disease both in the case of sheep (Rs 404) and goat (Rs 408). It was because the appearance of the animal changed drastically after the illness. The next major part of loss was due to the reduction in the production caused by the disease in both sheep and goats. In loss due to low production yield was of Rs 323 in sheep and of Rs 339 in goats, which is around 35 per cent of the total value, followed by the reduced price due abortion in sheep and goat, which was found to be around 20 per cent.

Treatment Expenditure in *Peste des petits ruminants* Disease

To find out the costs of treatment, number of animals infected, number of days remained infected, cost on medicine, additional labour, veterinary services, disinfectant and infertility were estimated. It could be seen from Table 5 that the major portion of cost was on the medicines, followed by infertility charges in both sheep and goats. These two factors alone had caused more than 82 per cent of the cost in both sheep and goats. The cost on medicine was Rs 85 in sheep and Rs 80 in goats. Next to medicine, the infertility charges were found out to be major cost item in both sheep (Rs 52) and goats (Rs 47). The charges on veterinary services, labour, and disinfectant were low and ranged from 3 per cent to 5 per cent. The total cost incurred to treat peste-des-petits ruminants disease was found to be Rs 162 in sheep and Rs 155 in goat.

Table 5. Treatment cost paid by farm respondents

(in Rs)

Cost components	Small ruminants	
	Sheep	Goat
Medicines	86 (52.04)	80 (51.61)
Veterinary services	8 (4.94)	8 (5.16)
Labour charges	9 (5.56)	9 (5.81)
Disinfectant charges	4 (2.46)	6 (3.87)
Infertility charges	52 (32.04)	47 (30.33)
Miscellaneous costs	3 (1.86)	5 (3.22)
Total cost components	162 (100.00)	155 (100.00)

Note: Figures within the parentheses indicate percentages to the total

Financial Loss due to Mortality of Sheep and Goats

The financial loss due to mortality in the affected animal farm was on an average Rs 21368 in sheep farm and Rs 1673 in goat farm (Table 6). Only the value of animal was considered for estimating the loss due to mortality in a farm. By taking a liberal view based on farmer's response and animal's price (around

Table 4. Losses due to *peste des petits ruminants* in Maharastra

(in Rs)

Animal	Reduction in production	Reduction in price due abortion	Reduction in market value	Reduction in wool/hair quality	Total
Sheep	323 (35.18)	185 (20.15)	404 (44.01)	6 (0.66)	918 (100.00)
Goat	339 (35.87)	193 (20.42)	408 (43.18)	5 (0.53)	945 (100.00)

Note: Figures within the parentheses indicate percentages to the total loss

Table 6. Financial loss due to mortality of sheep and goats

Parameters	Species	
	Sheep	Goats
No. of disease affected farms	57	26
No. of animals in farms	6014	340
No. of animals affected in farms	3187	175
No. of animal died in farms	812	29
Price per unit of dead animal, Rs	1500	1500
Total direct loss estimated, Rs	1218000	43500
Average loss per affected farm	21368	1673

Rs 1500/-) the loss was estimated to be of over one million rupees. In a state, where sheep and goat population is around 13.75 million (10.68 million goats and 3.07 million sheep), fifty per cent susceptible population can provide a loss not in millions but in billions to small and poor farmers. The annual loss due to goat disease with 11 per cent mortality has been estimated to be of Tk 870 million in Bangladesh (Sayeed *et. al.*, 2005)

Conclusions

The study has estimated the loss due to *peste des peste ruminants* disease in goats and sheep in the study area. Though the farmer is very small but the populations of small ruminants handling by them are in sizable number. The sudden outbreaks are major set back to them proportionate to their status. The major component of loss has been found due to reduction in the market value of animal after the disease in both goats and sheep. The study has found that the disease not only causes animal death but also leads to reduction in milk yield and weight loss, which reflect a huge liability on them and their farm economy.

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