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Analysis of Economic Loss Due to Equine Herpes Viral Infection

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Abstract Equine herpes virus 1 and 4 is considered to be cause of rhinopneumonitis abortion in horses which can cause severe economic loss to the equine industry. Outbreaks of EHV-1 and 4 result in poor racing performance, cancellation of race entries, decreased revenue to the race tracks, mortality, closure or quarantine of stud farms and restrictions on the movement of horses. In the present study an attempt has been made to quantify the loss due to loss of work function among the equids in Tamilnadu. The models used in evaluation of economic impact of animal disease on production can be grouped under two headings namely statistical/epidemiological models and economic models. Out of the data collected from 184 respondents, 67.50 per cent (27 out of 40) and 32.50 percent (13 out of 40) of horses were utilized for anti-snake venom production and patrol respectively. 95.45 per cent (84 out of 88) and 4.45 per cent (4 out of 88) of ponies were utilized for transport and riding respectively. 100 per cent (17 out of 17) of mules were utilized for anti-snake venom production, 100 per cent (30 out of 30) of donkeys were kept as pack animals. One donkey and eight foals were kept without any work. It has been found that income loss due to loss of work function was 95.45 per cent (Rs. 1,47,000) in case of equids utilised for anti-snake venom production, 74.13 per cent (Rs. 1,200) in case of equids used for riding, 62.50 per cent (Rs. 200) in pack animals and 50.80 per cent (Rs. 1,200) in case of equids used for transport purpose (Table 3). The economic loss on account of equine herpes viral infection among the equids was quite high. The loss due to the loss of work function ranged from Rs. 200 to Rs. 1,47,000.

Keywords *Equine Herpes Virus 1&4; Respiratory Disease; Abortion; Equine Industry; Economic Loss*

1. Introduction

Equine rhinopneumonitis is caused by two closely related herpes viruses, equine herpes virus 1 and 4 (EHV-1 and EHV-4). Infection by either one of the two viruses is characterized by a primary respiratory tract disease of varying severity that is related to age and immune status of the infected animal. Infection with equine herpes virus 1 cause not only restricted to respiratory mucosa but also to cause more serious disease manifestations as abortion, perinatal foal death, or neurological dysfunction (OIE, 2000).

ER can cause severe economic loss to the equine industry. Outbreaks of EHV-1 and 4 result in poor racing performance, cancellation of race entries, decreased revenue to the race tracks, mortality, closure or quarantine of stud farms and restrictions on the movement of horses.

In India outbreaks of EHV-1 was first recorded in 1965 and serosurveys conducted have proved the prevalence and endemicity. EHV-1 abortion is a significant cause of economic losses to the horse industry, while the losses associated with respiratory disease due to lost training time and poor race performance are unquantified (Gilkerson *et al*., 1999). In the present study an attempt has been made to quantify the loss due to loss of work function among the equids in Tamilnadu.

2. Materials and Methods

2.1. Analytical Tools for Estimating Disease Losses

Ngategize and Kaneene, 1985, developed models for evaluation of economic impact of animal disease on production can be grouped under two headings namely statistical/epidemiological models and economic models. These techniques could be used to identify the risk factors that contribute to the development of disease conditions, the magnitude and direction of the contribution and association between factors and diseases.

2.2. Methodology to Study the Economic Losses Due to Equine Herpes Viral (Ehv 1 and 4) Infections

The data required for analysis was collected from the owners of horses, ponies, mules & donkeys of six selected districts of Tamilnadu (Table 1)

Based on utility the equids were classified into five categories:

(1) Anti snake venom production (2) Transport (3) Riding (4) Patrol (5) Pack animals

- Simple random sampling was used to select the sample from the population.
- The data relating to prices of different inputs were also collected
  Capital Investment: Cost of the animal, equipments (Brush, Rope, Harness, Coach)
  Variable Costs: Feeding cost, labour cost, shoeing cost, veterinary costs
- The data collected include morbidity and mortality losses (if any)
- The morbidity losses include
  - i) Loss in production/ work function
  - ii) Loss incurred upon disease control measure
  - iii) Miscellaneous losses as per (Ngategize and Kaneene, 1985)
- The mortality losses included foal loss

The data collected on the questionnaire specially prepared for this purpose (Appendix-I)

3. Results and Discussion

3.1. Economical Losses Due To Equine Herpes Viral Infections

3.1.1. Data Analysis

Utility

Out of the data collected from 184 respondents, 67.50 per cent (27 out of 40) and 32.50 percent (13 out of 40) of horses were utilized for anti-snake venom production and patrol respectively. 95.45 per cent (84 out of 88) and 4.45 per cent (4 out of 88) of ponies were utilized for transport and riding respectively. 100 per cent (17 out of 17) of mules were utilized for anti-snake venom production, 100 per cent (30 out of 30) of donkeys were kept as pack animals. One donkey and eight foals were kept without any work (Table 2).

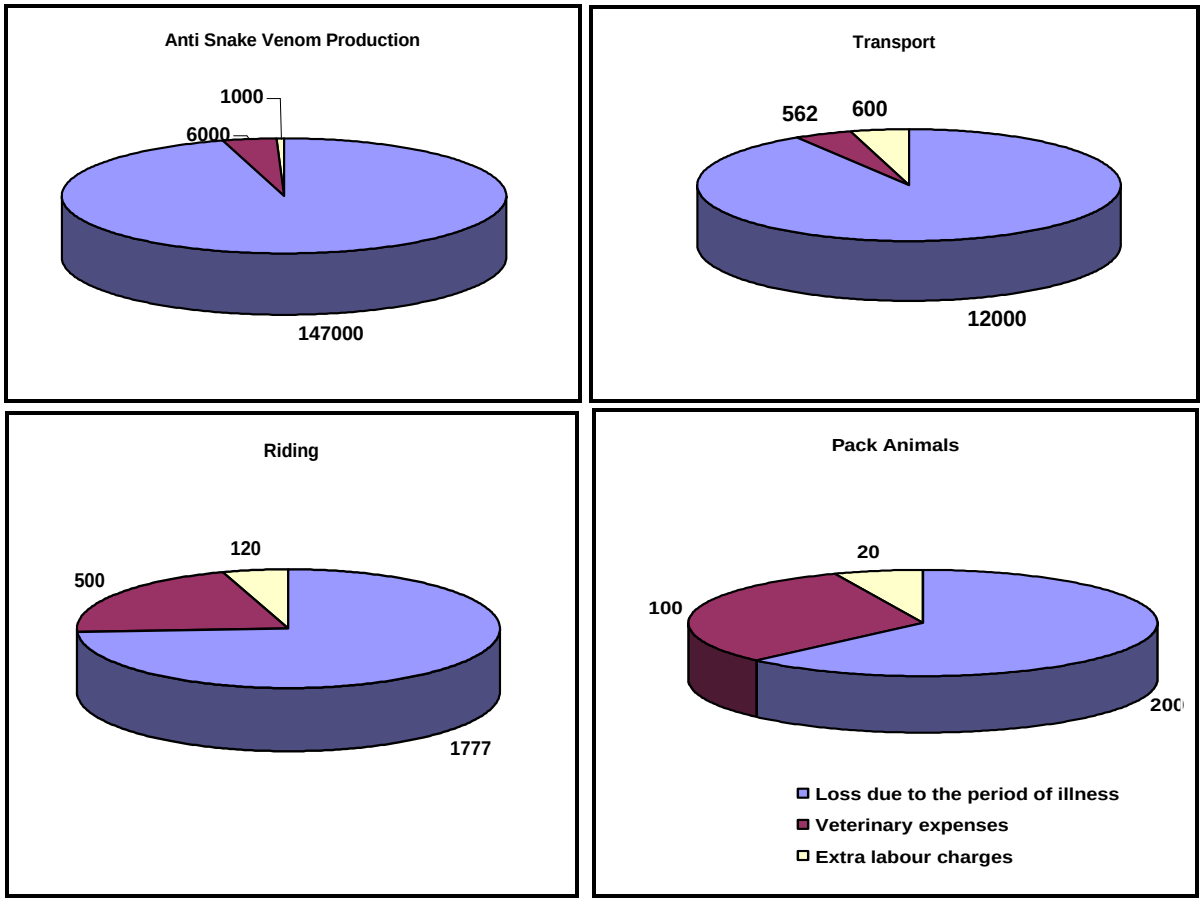

Figure 1: *Average Annual Economic Loss Due to Equine Herpesviral Infection (Per Animal/ Annum in Rupees)*

Table 1: *Economic Data Collected from Equid Owners/Respondents in Six Districts of Tamilnadu*

Sl. No.	District	Species			Total
		Horses and Ponies	Mules	Donkeys	
1.	Chennai	36	17	1	54
2.	Madurai	13	0	0	13
3.	Tiruvannamalai	16	0	0	16
4.	Theni	11	0	30	41
5.	Dindigul	50	0	0	50

6.	The Nilgiris	10	0	0	10
	Total	**136**	**17**	**31**	**184**

Table 2: *Utility of Equids in Selected Regions of Tamilnadu*

Utility	Species			
	Horses	Ponies	Mules	Donkey
Anti-snake venom production	27 (67.50)	0	17	0
Transport	0	84 (95.45)	0	0
Riding	0	4 (4.45)	0	0
Patrol	13 (32.50)	0	0	0
Pack animals	0	0	0	30 (100)
Total	**40**	**88**	**17**	**30**

Note: One donkey and eight foals kept idle were not shown in the Table

Table 3: *Average Annual Economic Loss Due to Equine Herpesviral Infection (Per Animal/ Annum in Indian Rupees)*

Components of Economic Loss	Anti-snake venom Production	Transport	Riding	Pack Animals
Loss due to the period of illness (Rs.)	1,47,000 (95.45)	12000 (50.80)	1777 (74.13)	200 (62.50)
Veterinary expenses (Rs.)	6000 (3.89)	562 (23.79)	500 (20.85)	100 (31.25)
Extra labor charges (Rs.)	1000 (6.49)	600 (25.40)	120 (5.00)	20 (6.25)
Total economic loss	**1,54,000**	**2,362**	**2,397**	**320**

(Figures in parentheses indicates the percentage to the total)

3.2. Economic Losses Due to Equine Herpes Viral Infection

Majority of the equines (96-97 per cent) in India are owned by landless, small and marginal farmers belonging to socio economically deprived communities in rural and semi urban area (ICAR, 2000).

Equine herpes viral infection poses major threat to the equids worldwide causing severe economic losses and most of the authors have recorded the loss due to abortion (Bryans, 1981; Galosi *et al.,* 1989 and Gilkerson *et al.,* 1999) and quantification of the economic loss due to loss of work function was not available. EHV-1 and 4 are substantial because of abortion and respiratory disease of racehorses in training (McGee, 1970).

Retrospective study conducted by Bryans (1981) from 1940 to 1979 in Kentucky, USA, identified 1,524 herpes viral abortions, an average of 39 per year which represented an annual loss of 0.4 to 2.6 per cent of fetuses.

The mortality losses from uncomplicated respiratory infection of EHV-1 in track horses are negligible, but such infections result in substantial indirect financial losses from costs of treatment, cancellation of race entries, decreased revenue to the race tracks and interrupted training schedule (Bryans, 1981).

Galosi *et al*. (1989) reported that infection by the viruses EHV-1 and EHV-4 is a serious economic problem in the Argentina horse industry due to abortion in breeding farms.

Outbreaks of EHV-1 causes economic loss to the racing and breeding industries as they result in poor racing performance, mortality, closure or quarantine of stud farms following cases of abortion and restrictions on the movement of horses (Mumford, 2000).

In the present study an attempt has been made to quantify the loss due to loss of work function among the equids. It has been found that income loss due to loss of work function was 95.45 per cent (Rs. 1,47,000) in case of equids utilised for anti-snake venom production, 74.13 per cent (Rs. 1,200) in case of equids used for riding, 62.50 per cent (Rs. 200) in pack animals and 50.80 per cent (Rs. 1,200) in case of equids used for transport purpose (Table 3).

The economic loss on account of equine herpes viral infection among the equids was quite high. The loss due to the loss of work function ranged from Rs. 200 to Rs. 1,47,000.

Though, the loss stated above in the anti-snake venom production was high the owner (King Institute of preventive medicine) can bear the loss. But loss among the other categories namely riding, transport and pack animals cannot be borne by the owners because; most of their livelihood entirely depends upon the income from the equids.

4. Conclusion

Equine herpes virus 1 and 4 not only cause respiratory infection but also involves reproductive and muscular system which cause economic loss by abortion, reduced productivity in case of snake venom production and also animals which are involved in riding and transport will affect livelihood of the persons. It is necessary to screen the animals and vaccinate against the disease.

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Appendix I

Seroprevalence of Ehv-1 and 4 in Equids of Tamilnadu

Owners Name: Date of collection:
Address: Sample No.

Equid Species: Horse / Pony / Donkey
Breed: Sex: Age: Colour:
Source: Bred / from breeders if breeders specify

Identification

Markings: Face: Leg: Dentition:
Purpose/Utility: Breeding / Racing / Transport / Show / Patrol / Others
Hours of Work:

Purpose	Horses	Donkey / Mule	Pony
Training			
Racing			
Transport			
Show / Riding			

Housing: Stable / Loose Box / Open Area

Feeding Schedule: Time: Roughage :
Concentrate:

Past History: Vaccination: Deworming:
Foaling: Shoeing
Treatment:

Present History: CMM: Pale / Pink / Icteric / Others
Temp: H/R:
R/R: Nasal Discharge:

Samples collected: Dung / Blood smear / EDTA blood / Whole blood

Symptoms: Respiratory: Skin:
Digestive: M. Skeletal:
Reproductive: CNS:

Economics

Earning / Day	Horses	Donkeys / Mules	Ponies
Riding			
Racing			
Transport			

Duration of Previous Illness : Loss of No. of Working Days :
Loss per Day : Cost of a Foal :