SOME EPIDEMIOLOGICAL ASPECTS AND ECONOMIC LOSS OF BOVINE EPHEMERAL FEVER OUTBREAK IN TUBAN AND SURROUNDING AREAS, EAST JAVA, INDONESIA

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ABSTRACT

An analysis is made of some epidemiological aspects of an occurrence of bovine ephemeral fever (BEF) in and around Tuban, East Java, Indonesia between 1978 and 1982. The disease was shown to affect mostly adult male cattle and its geographical distribution is related to the prevailing seasonal windflow. Haemorrhagic septicaemia (HS) was shown to have been a significant complication factor, since a vaccination campaign against HS and individual treatments with broad spectrum antibiotics and vitamins reduced the mortality rate from 36.36% in 1978 to 2.35% in 1982. An attempt is made to quantify the economic loss, taking into account not only directly measureable factors such as market prices, but also the cost of lost animal labour.

INTRODUCTION

Bovine ephemeral fever (BEF), or three days sickness is an infectious disease mostly affecting cattle (Andrewes *et al.* 1978; Buxton & Fraser, 1977) and rarely buffaloes (Malviya & Prasad, 1977). Affected animals show clinical signs such as lameness, nasal discharge, immobility and increase body temperature. The disease stops 2-3 days after the appearence of the symptoms (Anonymous, 1977). Although mortality is very low at less than 1% (Uren *et al.*, 1982), the disease affects animal productivity and export quality (Anonymous, 1977). The viral agent of the disease is transmitted by the biting midge or *Culicoides* spp. (Davis & Walker, 1974) and it has also been isolated from mosquitoes (St. George *et al.*, 1975).

BEF may affect cattle of all ages, but it mainly affects adults (Spradbrow, 1977). The disease has been found in several countries, such as Australia (Burgess & Spradbrow, 1977; Doherty, 1977; St. George, 1979), Japan (Kurogi *et al.*, 1977; Miura *et al.*, 1980), India (Malviya & Prasad, 1977) and Kenya (Davis & Walker, 1974). In Indonesia BEF was reported in dairy cattle by Merkens in 1919 and Burggraaf in 1932 (Merkens, 1919; Burggraaf, 1932). In 1978 a suspected outbreak of BEF in local cattle erupted in Tuban and surrounding areas (Suharsono *et al.*, 1981).

This paper reports on an analysis of some epidemiological aspects of the disease and the economical loss caused by it in Tuban and surrounding areas from June 1978 to February 1982.

MATERIAL AND METHODS

Clinical signs and pathological pictures of the disease were obtained from field studies. Epidemiological aspects were analysed from weekly reports of the local Animal Husbandry Service and data collected by the Research Institute for Animal Disease (RIAD). For estimation for the economic loss information from local farmers and prices for cattle in the local market were collected.

RESULTS AND DISCUSSION

Epidemiological Aspects

1. Disease outbreak

The disease first erupted in June 1978 in the subdistrict of Parengan, Tuban, East Java and spread out to surrounding areas as far as Lamongan and Bojonegoro districts. Within three months of the outbreak cattle mortalities in Tuban, Lamongan and Bojonegoro areas were as high as 53%, 56% and 73% respectively. Clinical signs of BEF exhibited in this study were similar to those described in earlier studies (Anonymous, 1977; Malviya & Prasad, 1977; Suharsono, 1981).

The disease outbreak continued from June 1978 to February 1982, its incidence varying according to the season: increasing during the wet season and decreasing in the dry season. The incidence peaked in January 1979, December 1979 and September 1981. In February 1982 no cases were reported (Fig. 1).

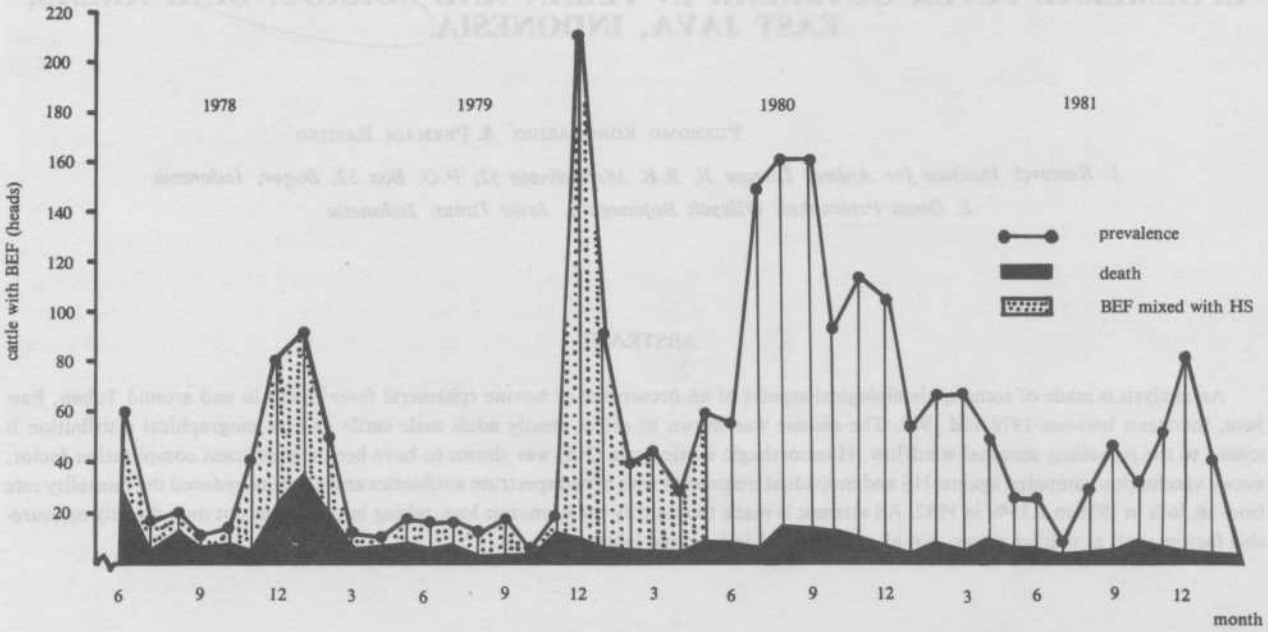

Figure 1. Disease prevalence and mortalities during an outbreak of bovine ephemeral fever from June 1978 to February 1982

At the beginning of the outbreak, specimen of the internal organs of dead animals were sent to RIAD for laboratory analysis, in which *Pasteurella multocida* was isolated (RIAD, unpublished data). This bacteria was again isolated from a dead and diseased cattle (laporan FKH-Unair, 1979) by the Faculty of Veterinary Science, Airlangga in November 1979).

2. Cattle mortalities

From the data obtained it is clear that the BEF outbreak in Tuban and surrounding areas was a mix infection with HS, at least during the period up to November 1979. However, RIAD team visiting the infected areas in January 1980 could not find *P. multocida,* either from the dead cattle or blood samples of diseased animals. This HS contamination caused high mortalities during the period from June 1978 to November 1979. Mortalities were 36.36% in 1978 and 25.05% in 1979 (Table 1).

Table 1. Cattle mortality in the districts of Tuban, Lamongan and Bojonegoro during an outbreak of bovine ephemeral fever

Year	mortality	percentage
1978	92/ 253	36.36
1979	120/ 479	25.05
1980	77/1092	7.05
1981	38/ 557	6.82
1982	2/ 85	2.35

To reduce mortalities the Local Animal Husbandry Service treated all cattle in the infected areas by mass HS vaccination and individual treatment of sick animals with a combination of a broad spectrum antibiotic and vitamins. The campaign was successful since cattle mortality dropped in 1980 to 7.05%, even though the incidence of the disease was the highest in this year (more than 44% of the total incidence during the outbreak). Mortalities in the last two years continued to decline to only 6.82% and 2.35% respectively in 1981 and 1982.

Although cattle mortalities were reduced during the last three years, they were still high for BEF. Previous authors have claimed that BEF mortality was only as high as 1% (Spradbrow & Francis, 1969; Uren *et al.,* 1982). This difference in mortalities was perhaps due to individual complications in the sick animals during the period of viral infection (Malviya & Prasad, 1977).

3. BEF distribution in cattle

To analyse BEF data in Tuban, it was decided to wait six months (from November 1979) to eliminate the possible influence of HS in the data.

From May 1980 to February 1982, 1,089 BEF cases were recorded, of which 60.99% were males. The age distribution was 1.65% calves, 18.09% young, 76.44% adult and 3.77% old animals (Fig. 2).

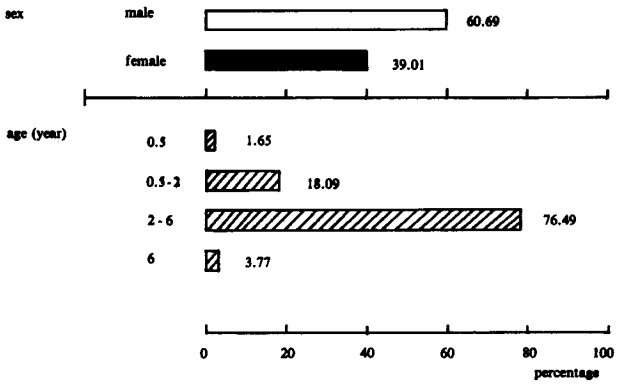

Figure 2. Relationship between sex and age of animals infected with bovine ephemeral fever during the period of May 1980 to February 1982

The data differed slightly from that of Spradbrow and Francis (1964). By simplifying their data it was found that 57.32% were female, 86.26% adult and 15.74% young cattle. The data again differed from those presented by Malviya and Prasad (1974) for crossbred cows in India. Both scientists found that 67.3% of infected animals were adults, 19.3% immature and 11.6% calves, besides which 1.8% were buffaloes. The differences between the above data were probably due to several reasons, including the breed of cattle, breeding system and different climatic conditions. Cattle from the Tuban areas were dual-purpose animals, being used both for beef and traction. They were maintained semi intensively, 1-3 head/farmer and were reared in a tropical environment.

4. BEF distribution in the infected areas

The incidence of BEF cases in Tuban and surrounding areas varied during the period from May 1978 to February 1982. The cases in Tuban, Lamongan and Bojonegoro were as high as 47.47%, 48.49% and 4.23% (Table 2).

Table 2. Distribution of bovine ephemeral fever in the districts of Tuban, Lamongan and Bojonegoro during the period of May 1978 to February 1982

Age (year)	District					
	Tuban		Lamongan		Bojonegoro	
	male	female	male	female	male	female
≤ 0.5	10	6	1	—	—	1
> 0.5-2	46	57	11	63	10	10
> 2-6	226	142	79	363	13	10
> 6	19	3	8	8	2	1
Total	301	208	99	434	25	22

If the figures were compared with the data from Australia relating to the outbreaks of BEF in 1967/68 and 1972/73 (the distribution of which was influenced by the prevailing seasonal north-west windflow (Muray, 1970; St. George *et al.*, 1973) both sets of data were similar. The Parengan subdistrict (where BEF first erupted) is geographically situated to the north-west of Lamongan and Bojonegoro and the direction of the wind in the wet season (when the first outbreak erupted) was also from Parengan to Lamongan and Bojonegoro. Hence, the BEF virus in biting midge (*Culicoides* spp.) was probably carried by the wind and spread to Lamongan and Bojonegoro.

From the BEF experience in Australia, it has been shown that every epizoosis of the disease is followed by the silent period for some years (Muray, 1970; St. George *et al.*, 1973). Eventhough the clinical signs of BEF during the silent period are not apparent, it is believed that the disease is still present subclinically (St. George *et al.*, 1973). Besides this, buffaloes may also act as reservoirs of BEF virus (Anonymous, 1977; Young, 1979). For this reason the possibility of a recurrence of BEF in Indonesia in the future is also great. The experience of the disease in Tuban and the surrounding areas-where cattle mortalities were very high, especially when BEF co-occured with another disease (HS)-is a valuable reminder for each decision maker to treat the disease as early as possible.

Economic Loss

An accurate estimation of economic loss caused by BEF was almost impossible, because it could not be determined by the price of cattle alone. Other conciderations had to be taken into account, which were too complex to be expressed in terms of monetary figures. For example, cattle as the source of manure for the farmer, disguised unemployment in the farmer's family and the future development of his farm had to be taken into account. Nevertheless, the following estimate of loss might be made:

1. Dead cattle

During the outbreak of BEF, 264 adult and 65 young cattle died. The market price for an adult and young animal at the time were Rp. 400,000.— and Rp. 200,000.— respectively. So the total value of cattle lost was Rp. 118,600,000.—

2. Drugs used

The approximate cost of drugs used by the Local Animal Husbandry Service to treat sick animals was Rp. 10,000.—/head. The total cost of medication during the disease outbreak was Rp. 26,660,000.—

3. Traction

All adult cattle in these areas were used mostly by the farmers for traction to prepare their rice fields during the wet season. The labour cost of draught cattle was Rp. 2,000.—/head/day. During the outbreak of the disease the infected cattle had to have a 30 day rest. The number of diseased adult cattle was 2,240 head and so the cost of labour lost was Rp. 128,400,000.—

Hence the total loss due to the disease was as high as Rp. 273,660,000.—, or approximately $US 400,000.—

REMARKS

In some countries not frequented by infectious diseases of economic importance, such as Australia, BEF loss is not as significant as in Indonesia, where several infectious diseases are endemic. Stress caused by the disease will enable bacteria like *P. multocida* to be more active and so give rise to high mortalities. Quick diagnosis is therefore very important to allow the correct treatment and vaccination in order to overcome an outbreak such as that in Tuban.

Insecticide application by the Local Animal Husbandry Service to control insects is a wise step, but attention should be paid to their use. Insecticide must be strictly controlled to prevent an overuse of the chemicals and an upset of the ecological balance in the area.

Research results on BEF vaccine productions and their use in Australia (Della Porta & Snowdon, 1979; Doherty, 1977; Snowdon, 1970) should be carefully studied in advance to determine whether the vaccine would be valuable in the control of the disease in Indonesia.

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