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Sporadic Outbreaks of Surra in the Philippines and its Economic Impact

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ABSTRACT

surra occurs in all 13 regions of the Philippines particularly Regions 2, 3, and 4 in Luzon and Regions 9, 10 and 11 in Mindanao. Based on government reports from 1989 to 1997, carabao (swamp buffalo) is the most commonly affected (3,819 cases), followed by horse (3,430 cases) and cattle (2,005 cases). Mortality rate is highest in horse (345 deaths) and least in cattle (122 deaths). These figures are far from the actual numbers of cases and deaths which have not been properly reported due to misdiagnosis and poor monitoring system.

Clinical manifestations in cattle, carabao and horse infected with Philippine strain of *Trypanosoma evansi*, are intermittent fever, severe anemia, progressive loss of condition despite fairly good appetite, leg weakness, incoordination, prostration, circling movement, running aimlessly, sudden collapse and death if not treated. Other clinical signs are scrotal swelling and anestrus in ruminants. Abortion and congenital transmission in cattle have been observed. Infected animals may remain negative on blood examination but positive by mouse inoculation test.

Considerable economic losses due to surra is estimated to be P44.8 M ($1,149,230.70) in nine years, excluding losses attributable to decreased meat and milk yield, poor reproductive performance, cost of labor and medication.

INTRODUCTION

surra is a disease condition caused by a haemoflagellate known as *Trypanosoma evansi* (Steel, 1885). According to Salmon and Stiles (1902) *T. evansi* was first detected in 1901 by Drs. Slee and Kinyoun from the blood of native and imported horses.

surra has been known in India since 1880 as reported by Dr. Griffith Evans (Salmon and Stiles, 1902). The introduction of surra in the Philippines prior to 1901 is not exactly known but it has been speculated that the blood parasite must have been carried to China from India by English troops and later the American troops carried it from China to the Philippines. The detection of surra among horses in the Philippines led to prohibition of landing any animal from the Philippines to any part of the United States of America (Salmon and Stiles, 1902).

Surra is highly fatal to horses. Carabaos (swamp buffaloes), buffaloes, sheep, goats and pigs are considered resistant to *T. evansi* infection. They serve as important reservoir hosts which may harbor the organisms without showing clinical manifestations. However, these animals also succumb to surra if exposed to severe stress conditions such as long distance travel, lack of feed, overworked, decreased resistance due to secondary or concurrent viral, bacterial or parasitic infection.

SYMPTOMATOLOGY

The main clinical signs common to most surra cases are anemia, progressive loss of condition leading to emaciation despite fairly good appetite in many cases, remittent or intermittent mild to moderate fever, extreme leg weakness, edema of pendant parts of the body, paroxysmal trypanosome parasitemia, depression, recumbency, prostration and death.

The other significant signs observed in some cases are decreased breeding efficiency, scrotal swelling in bulls, rams and bucks, failure to come into heat (anestrus) in female ruminants (de Jesus 1963; de Villa et al. 1991); nervous signs like circling movement, and trembling, unusual aggressiveness, running aimlessly and sudden collapse in severely stressed and overworked cattle and buffaloes. Urticarial eruptions and extreme thirst have been observed in horses. Abortion in cattle have been reported (Manresa 1935; Cresencio et al. 1994).

In 11 goats artificially infected with *T. evansi* de Villa et al. (1991) recorded the following observations: emaciation, scrotal swelling in one out of eight males, keratitis, nervous signs in all 11 goats, failure to come in heat in 3 out of 3 females, prostration and death in 9 (81.8 percent) out of 11 infected goats which occurred 19 to 44 days post infection. Fever was not observed in all the experimental goats.

In pigs, intermittent fever, anemia, progressive loss of condition, increased respiration and pneumonic signs were observed (Batolos and Somoray, 1989).

In dogs, the common signs are keratitis, anorexia, icterus, paroxysmal fever, extreme leg weakness and emaciation (Yutuc 1931; Carlos et al. 1970; Miranda et al. 1988).

Spontaneous or definite recovery in 54 surra cases after an infection period ranging from 31 to 304 days in cattle and 24 to 321 days in water buffaloes had been reported (Manresa and Gonzalez 1935; 1936). Chronic surra in cattle and carabaos transformed into latent form in which the animals were apparently healthy but still harbor some trypanosomes which are not demonstrated by thin blood smear examination but only by mouse inoculation test (MIT) had been observed.

TRANSMISSION

surra is transmitted mechanically by blood sucking insects notably the horseflies (*Tabanus* spp.), stableflies (*Stomoxys calcitrans*), buffalo flies (*Lyperosia exigua*) and mosquitoes (Mitzmain 1913; Kelser 1927). Nonblood sucking flies like the houseflies (*Musca* spp) can also transmit *T. evansi* through feeding from blood oozing from wound and mucous membrane of infected animals. Ingestion of raw infected meat or blood by carnivores may also effect transmission of surra organisms (de Jesus 1951). According to Manresa and Gonzalez (1936) intra-uterine infection was not found in 15 calves borned from infected mother. On the contrary, Cresencio et al. (1994) presented evidence of congenital transmission in calves from *T. evansi* positive dams.

GOVERNMENT REPORT

Based on the National Animal Disease Situation Report of the Bureau of Animal Industry (BAI) from 1989 to 1997, surra occurs in all 13 regions of the Philippines. The total number of surra cases and deaths in carabaos, cattle and horses from 1989 to 1997 by region is shown in Table 1. surra is particularly prevalent in Region 2 (915 cases and 38 deaths), Region 3 (2,156 cases and 96 deaths), Region 9 (1,498 cases and 22 deaths) and Region 11 (1,101 cases and 116 deaths).

The total number of surra cases and deaths from 1989 to 1997 (9 years) is shown

Table 1. Total number of surra reported cases (C) and deaths (D) by region from 1989 to 1997

REGION	CARABAO		CATTLE		HORSE		TOTAL	
	C	D	C	D	C	D	C	D
CAR[a]	296	10	48	7	103	22	447	39
1	134	3	249	5	112	27	495	35
2	511	19	252	5	152	14	915	38
3	1323	37	644	50	189	9	2156	96
4	486	113	275	19	639	96	1400	228
5	41	0	8	4	85	19	134	23
6	449	20	37	3	66	11	552	34
7	154	7	35	0	1	0	190	7
8	1	0	4	4	1	0	6	4
9	135	0	181	6	1182	16	1498	22
10	16	2	2	1	55	8	73	11
11	218	62	265	13	618	41	1101	116
12	55	7	5	5	227	82	287	94
TOTAL	3819	280	2005	122	3430	345	9254	747

[a]Cordillera Autonomous Region

Source: National Animal Disease Situation Report, Bureau of Animal Industry, Department of Agriculture, Philippines, CY 1989 to 1997.

in Table 2. The carabao (water buffalo) is the most commonly affected species (3,819 cases) followed by the horse (3,430 cases) and cattle (2,005 cases). The mortality rate was highest in the horse (345 deaths) and least in cattle (122 deaths).

Table 2. Total number of surra cases (C) and deaths (D) from 1989 to 1997.

YEAR	CARABAO		CATTLE		HORSE		TOTAL	
	C	D	C	D	C	D	C	D
1989	988	113	291	8	1099	66	2378	187
1990	1367	49	755	58	694	22	2816	129
1991	722	19	199	8	438	75	1359	102
1992	139	0	27	2	90	27	256	29
1993	144	8	107	9	140	21	187	32
1995	43	13	51	9	189	33	283	55
1996	212	47	456	19	640	67	1308	133
1997	143	25	57	8	76	9	276	42
TOTAL	3819	280	2005	122	3430	345	9254	747

Source: National Animal Disease Situation Report, Bureau of Animal Industry, Department of Agriculture, Philippines 1989-1997.

These figures are far from the real or actual number of field surra cases and mortality rate due to non-reporting by animal owners and government personnel, misdiagnosis and poor monitoring system by government offices. A more realistic number would be 5 to 10 times the government record. In the remote areas which are far from government centers,

surra cases and deaths are seldom if at all reported by farmers. Animal owners prefer to sell their sick animals even at a great loss. The non-reporting and poor monitoring system of animal diseases in recent years was attributed mainly to the implementation of Local Government Code of 1991 which decentralized or devolved the functions, responsibilities and governance of veterinarians, technicians, diagnosticians and livestock inspectors to the local government units. The Bureau of Animal Industry was converted into a staff agency from the line bureau prior to 1991 resulting in the worst demoralization among the animal health personnel. Furthermore, most livestock diseases were diagnosed symptomatically without appropriate laboratory examination as most regional diagnostic centers lack equipment, facilities and supplies, including human and funding resources. This is reflected in the records prior to 1991 which were much higher than those recorded after the implementation of the Local Government Code of 1991 (Fig. 1).

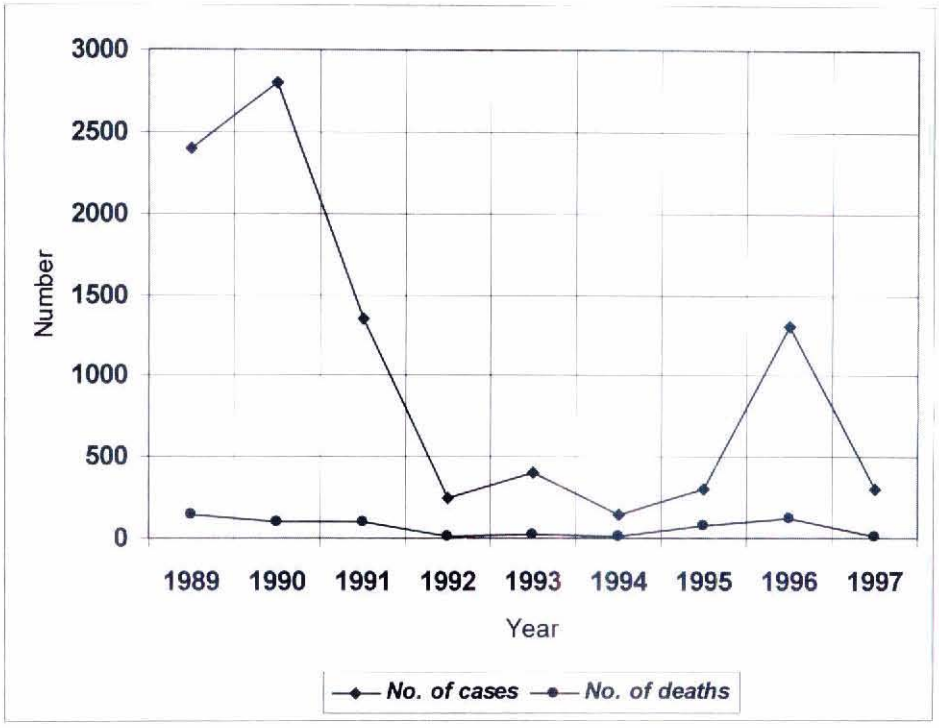

Figure 1. Number of surra and death from 1989 - 1997.

Natural field surra cases in goats are rarely encountered. Seven cases and 2 deaths were recorded in Region 4 in 1995 and 6 cases and 4 deaths in Region 11 in 1997 by the Bureau of Animal Industry.

EPIDEMIOLOGICAL REPORTS

Serological Studies: A review of published reports revealed that surra is widespread and prevalent in the Philippines. Kelser (1927) obtained 50% of 141 carabaos and 22 percent of 54 cattle from various parts of Luzon island positive for *T. evansi* by compliment fixation test (CFT). Randall and Schwartz (1936) using CFT obtained 24.6 percent of 61 water buffaloes and 11.8 percent of 425 cattle positive for *T. evansi* infection. Using the same method Topacio et al. (1938) found 19.3 percent of 2,424 buffaloes and 2.54 percent of 2141 cattle positive for *T. evansi* infection.

Sporadic Outbreaks: Several surra outbreaks have been reported. Gomez (1926) stated that records do not reveal the real surra situation in the Philippines but from 1921-1924 a total of 398 surra cases and 388 deaths in horses have been recorded. Yutuc (1935) mentioned that 113 cavalry horses were destroyed in 1902 due to an outbreak of surra in the towns of Sta. Cruz and Pila, province of Laguna to prevent the spread of the disease. The same author reported that 85 surra cases (80 horses, 1 carabao, 2 cattle and 2 dogs) have been recorded within a period of 14 years (1919-1933) in many towns of Laguna, island of Luzon.

Fernandez et al. (1960) reported an outbreak of surra at the Animal Quarantine Station of the Bureau of Animal Industry in Pandacan, Manila wherein one Sta. Gertrudes bull died of surra and 7 were found positive for *T. evansi* upon blood smear examination. The animals consisted of 76 cattle; 8 water buffaloes and 8 horses. The positive animals were treated with diminazene aceturate (Ganaseg/Berenil) while the other animals with given prophylactic medication with antrycide prosalt. The same authors mentioned a successful prophylactic medication of a 1951 surra outbreak at Sta. Mesa Dairy Farm with sodium naphuride and a surra outbreak among buffaloes at Alabang Stock Farm with antrycide methyl sulfate medication.

A case of surra in pigs was reported by Batolos and Somoray (1989) which occurred in Dagami Artificial Breeding Center, province of Leyte, Eastern Visayas. The outbreak concerned 2 boars and a sow which occurred in May, 1989. One of the boars suddenly developed irregular fever, inappettence, progressive loss of weight, weakness, anemia and increased breathing, pneumonic signs and died despite antibiotic medication. A week after death of the first boar, the sow and the second boar developed clinical manifestations similar to that exhibited by the first boar. On blood smear examination, the boar was found teeming with *T. evansi* while the sow was positive by mouse inoculation test. Both animals were treated with Berenil and recovered.

Four surra incidents/outbreaks were investigated, and described by R.O. Cresencio, P.L. Roeder, M.S. Tongson, A.T. Gonzalez, L.V. Jacobo, R.C. dela Pena and O.T. Abuso of the Philippine Animal Health Center-BAI which they presented at the 1994 Annual Convention of the Veterinary Practitioners Association of the Philippines in Manila.

The first outbreak as reported by Cresencio et al. (1994) is about 5 emaciated dehydrated and anemic yearling Philippine bred Brahman cattle which were transferred from a government stockfarm in the province of Nueva Ecija to the BAI compound in Quezon City. Two of the animals died of surra and one which was sacrificed revealed high trypanosome parasitemia on blood film examination. The remaining 2 were treated with imidocarb and remained negative for 4 months (February to May, 1994).

The second outbreak involved a herd of 150 locally born Brahman cattle in the town of Quezon, Nueva Ecija which occurred on March to April, 1994. Seven cows died of surra characterized by incoordination, circling movement, running aimlessly and sudden collapse. Four of the 15 emaciated and anemic cows were highly paratemic with *T. evansi* on stained thin blood smear examination and one cow was positive by MIT. Six weeks later a total of 8 cows had aborted. Two calves (43 hours and 6 days of age) were anemic and too weak to stand. The 43-hour calf was highly parasitemic with trypanosomes while the older calf was positive by MIT. Both dams of the calves were positive for *T. evansi* (one by thin blood smear examination and the other by MIT).

The third outbreak occurred in April 1994 in the provinces of Agusan del Sur and Agusan del Norte in the island of Mindanao in which 276 carabaos, 20 cattle and 25 horses

died of surra. The clinical manifestations observed were loss of condition, extreme weakness, collapse and death ensuing 4 to 7 days later. The other signs exhibited by some animals were circling, aggressiveness, trembling, conjunctivitis, fluctuating fever, nasal discharges, lameness, diarrhea and abortion. Eight of the 15 emaciated carabaos have moderate to high trypanosome counts by stained blood smear examination.

The fourth incident/outbreak concerned an epidemic which occurred in several towns of Northern Samar, Visayas island in which more than 1000 carabaos died in a period of 6 months (Noember, 1993 to April 1994). In this epidemic two disease syndromes were recognized. One disease syndrome which killed 70 percent of the carabaos according to Cresencio et al (1994) was characterized by anemia, progressive wasting condition despite fairly good appetite over a period of weeks or months, terminating in recumbency and death within 3 days. The other disease syndrome was characterized by acute to peracute course with death occurring within 5 hours from its onset associated with high fever, drooling of saliva, nasal discharges, perioral swelling and rapid breathing.

An overlap of two diseases (surra and hemorrhagic septicemia) was reported in some affected carabaos. Thirteen of the 19 chronic cases were parasitemic with *T. evansi* and Pasteurella multocida of Robert's capsular type B was isolated from tissues of 2 carabaos which died of peracute course (hemorrhagic septicemia). One of the carabaos had high trypanosome parasitemia.

Additional surra outbreaks diagnosed at the Philippine Animal Health Center (PAHC) of the Bureau of Animal Industry was provided by Dr. Ronel Abila, Chief Epidemiology Section of PAHC as follows:

a) An outbreak concerning 150 cattle from the town of Sta. Rita, Nueva Ecija in which 35 surra cases and 28 deaths were recorded in 2-weeks period (March 14 to 30, 1994). Of the 35 cases 26 were examined for *T. evansi* and 4 were found positive by direct blood smear examination.
b) An outbreak occurred in the town of Siniloan, Laguna in which 50 horses died of surra out of 100 cases in 3 months period (August to October 1996) diagnosed by clinical signs and blood examination.
c) A total of 101 horses were examined in Luisita Farm, Tarlac Province from October 9 to November 6, 1996 and 9 horses were found positive for *T. evansi* by direct blood examination which was the basis for instituting prophylactic medication.

In January, 1996 an outbreak of surra occurred in the town of Magdalena, Laguna in which 9 carabaos, 6 cattle and 20 horses had died within a period of 2 weeks as reported by the municipal mayor. A team from the College of Veterinary Medicine, UPLB investigated the outbreak which was diagnosed as surra based on history, clinical signs, finding *T. evansi* from stained blood smear examination and MIT.

In the sporadic surra outbreaks reported from 1994 to 1996 (3 years) a total of 1,151 deaths (985 carabaos, 71 cattle and 95 horses) have been documented compared to only 220 deaths recorded by the government on the same period. It appears that the Philippine strain of *T. evansi* is highly virulent as evidenced by the number of cases and deaths not only of horses but also carabaos, cattle, goats, pigs and dogs.

ECONOMIC IMPACT

Considerable losses due to surra have been incurred by the farmers attributable to morbidity and mortality rates, decreased milk and meat yield, poor reproductive

performance, lower value of affected animals, cost of labor and medication and decline in crop production.

The real number of surra cases and deaths in livestock cannot be ascertained but it is estimated that actual number would be more than 5 times the figures obtained from government records and could be more than 10 times in some instances.

Considering a conservative estimate of 5 times the reported figures by the government, the total number of cases from 1989 to 1997 (9 years) would be 19, 095 for carabaos, 10,025 for cattle and 17,150 for horses and the total number of deaths would be 1,400 for carabaos, 610 for cattle and 1,710 for horses. The combined total number of cases would be 46,270 and the number of deaths would be 3,735. At an average estimated value of P 12,000 per head, the total value of carabaos, cattle and horses that died in a period of 9 years would be P 44.8 M ($ 1.149 M). Assuming that the 46,270 cases have been sold for slaughter at half the real price, or P6,000 per head, the losses would be P277.6 M or a grand total loss of P322.4 M ($7.9 M) in a 9-year period. This estimate does not include losses due to decreased meat and milk yield, poor reproductive performance, cost of labor and medication and decreased crop production.

It is unfortunate that despite the economic importance of surra in livestock production and its widespread distribution in the Philippines, no organized and systematic program has been instituted to control or eradicate the disease up to the present.

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