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Bovine Babesiosis

1.1 Introduction

Babesiosis is caused by intra-erythrocytic protozoan parasites of the genus *Babesia*. The disease which is transmitted by ticks, affects a wide range of domestic and wild animals and occasionally humans. While the major economic impact of babesiosis is on the cattle industry, infections in other domestic animals including horses, sheep, goats, pigs, and dogs assume varying degrees of importance throughout the world.

Two important species in cattle *Babesia bigemina* and *Babesia bovis* are widespread in tropical and subtropical areas and cause the disease known as bovine babesiosis or tick fever which is fatal if not attended promptly.

European breeds of cattle are very susceptible and mortality after infection with *Babesia* species can be high. *Bos indicus* breeds such as Brahman, Sahiwal and to a lesser extent, crossbred cattle show resistance to the disease. Despite this, nearly 1 in 5 outbreaks of tick fever involves these breeds.

Calves from immune mothers receive temporary protection (maternal antibody) from the colostrum, which prevents clinical disease in the short term. However, the calves may still be infected at this time. This protection lasts about three months and in most cases is followed by an age resistance that lasts until the animals are about nine months old. Calves exposed to infection when the maternal antibodies are present or those who have age resistance is high rarely show clinical symptoms but develop a solid, long-lasting immunity.

If exposed to the disease later in life, they may develop a severe, life-threatening infection. Losses are likely when tick numbers on a property increase or when susceptible cattle are brought onto a tick-infested property.

Endemic stability is less likely to develop to *B bovis* than to *B bigemina* because *B bovis* has lower infection rates in ticks than *B bigemina*.

1.2 Epidemiology

The main vectors of *Babesia bigemina* and *B bovis* are *Boophilus species* ticks, in which transmission occurs transovarially. While the parasites can be readily transmitted experimentally by blood inoculation, mechanical transmission by insects or during surgical procedures has no practical significance. Intra-uterine infection has also been reported but is rare.

In *Boophilus species* ticks, the blood stages of the parasite are ingested during engorgement and undergo life cycles in the replete female, eggs, and subsequent parasitic stages. Transmission to the host occurs when larvae (in the case of *B bovis*) or nymphs and adults (in the case of *B bigemina*) feed on animals.

The percentage of larvae infected can vary from 0-50% or higher, depending mainly on the level of parasitaemia of the host at the time the female ticks engorge. Under field conditions, the rate of tick transmission is generally higher for *B bigemina* than for *B bovis*.

In endemic areas, two features are important in determining the risk of clinical disease: firstly calves have a degree of immunity (related both to colostral-derived antibodies and to age) that persists for approximately six months, and two years and secondly animals that recover from *Babesia* infections are generally immune for life. Thus, at high levels of tick transmission, all newborn calves will become infected with *Babesia* by six months of age, show few if any clinical signs, and subsequently be immune. This situation of endemic stability can be upset by either a natural (eg, climatic) or artificial (eg; acaricide treatment) reduction in tick numbers to levels such that tick transmission of *Babesia* to calves is insufficient to ensure all are infected during this critical early period. Other circumstances that can lead to clinical outbreaks include the introduction of susceptible cattle to endemic areas and the incursion of *Babesia*-infected ticks into previously tick-free areas. Strain variation in immunity has been demonstrated but is probably not of significance in the field.

The susceptibility of cattle breeds to *Babesia* infections varies; for example, *Bos indicus* cattle tend to be more resistant to *B bovis* and *B bigemina* infection than are European breeds.

1.3 Clinical signs

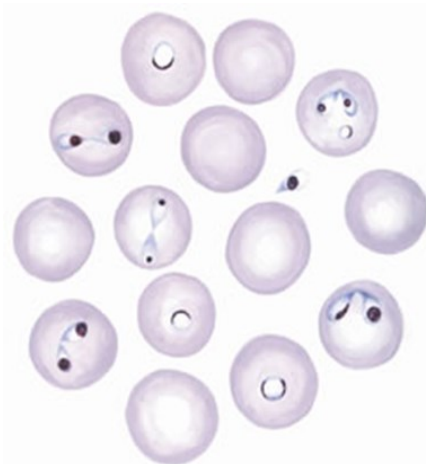
The acute disease generally lasts for a period of one week. The first sign is fever frequently 105.8°F [41°C] or higher which persists throughout, and is accompanied later by

inappetence, increased respiratory rate, muscle tremors, anaemia, jaundice, and weight loss; hemoglobinaemia and hemoglobinuria occur in the final stages. Central nervous system involvement due to adhesion of parasitized erythrocytes in brain capillaries can occur with *B bovis* infections.

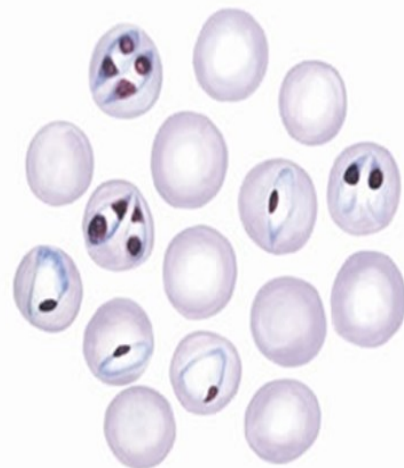
Either constipation or diarrhoea may be present. Late-term pregnant cows may abort, and bulls may undergo temporary infertility due to transient fever.

With virulent strains of *B bovis*, a hypotensive shock syndrome, combined with generalized nonspecific inflammation, coagulation disturbances, and erythrocytic stasis in capillaries, contribute to the pathogenesis. Whereas with most strains of *B bigemina*, the pathogenic effects relate more directly to erythrocyte destruction.

Animals that recover from the acute disease remain infected for a number of years with *B bovis* and for a few months in the case of *B bigemina*. No clinical signs are apparent during this carrier state.



Babesia bovis



Babesia bigemina

Post-mortem examination

In severe infections, congestion of most organs is intense with haemorrhages under the membranes of many internal organs. Prolonged cases may show signs of anaemia and jaundice. Light-red to dark-red discolouration of the urine is often seen. The spleen is enlarged, sometimes several times its normal size, and the cut surface resembles raspberry jam. The liver is swollen and may be yellowish-brown, with the gall bladder distended with large amounts of thick granular bile. The kidneys and lymph nodes are also enlarged. In cerebral babesiosis, the grey matter in the brain has a characteristic cherry-pink colour. Microscopically, *B. bovis* infections cause massive numbers of infected red blood cells to accumulate in the small blood vessels of the animal. This is not the case with *B. bigemina*

1.4 Diagnosis and Treatment

Diagnosis

The history of the cattle, clinical signs and post-mortem lesions are often suggestive of babesiosis but it is impossible to make an accurate diagnosis based on these findings alone. The simplest method to confirm the infection is by laboratory examination of stained blood smears from sick animals. Even blood smears and organ smears from dead animals can be useful, particularly brain smears. Laboratory examination will also distinguish between *B. bovis* and *B. bigemina* infections, an important feature when considering prognosis and control.

Treatment

The only drug available for use in the treatment of babesiosis is Imidocarb (Imizol[®] or Imidox[®]).

Recovery is the rule if treatment is given early in the course of the infection. If treatment is delayed, supportive therapy may be essential if the animal is to survive. This includes the use of blood transfusions, intravenous administration of fluids, good nutrition, shade and perhaps other supportive therapies.

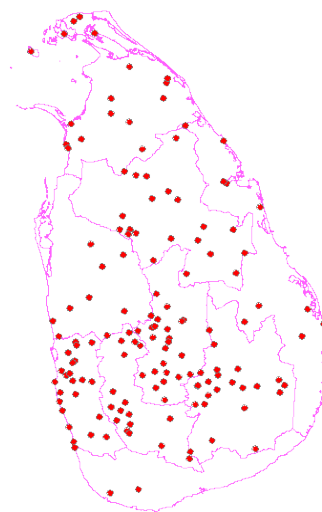
1.5 Control and Prevention.

There are several options for the prevention of babesiosis, ranging from keeping animals tick-free and use of Imidocarb for short-term control, to vaccinating with tick fever vaccine. In Sri Lanka Tick– fever vaccine has been produced and used in selected locations especially large dairy herds in hill country and upcountry in order to pre-immunize the calves. However since 2011 this has been extended to the field. Pre– immunization is carried out islandwide through the district Veterinary Investigation Officers, who launch the programme together with the relevant government veterinary surgeons..

2.1.1 Reported cases of Bovine Babesiosis : January – June 2012

Babesiosis is one of the important disease present in the country which leads to economic losses in dairy industry. A total of 1068 cases of bovine babesiosis have been recorded during the first half of the year 2012. The highest number of 222 cases was found during the month of January and the lowest number of 137 was found in May. There has been 52 deaths of cattle due to this disease during the period under review.

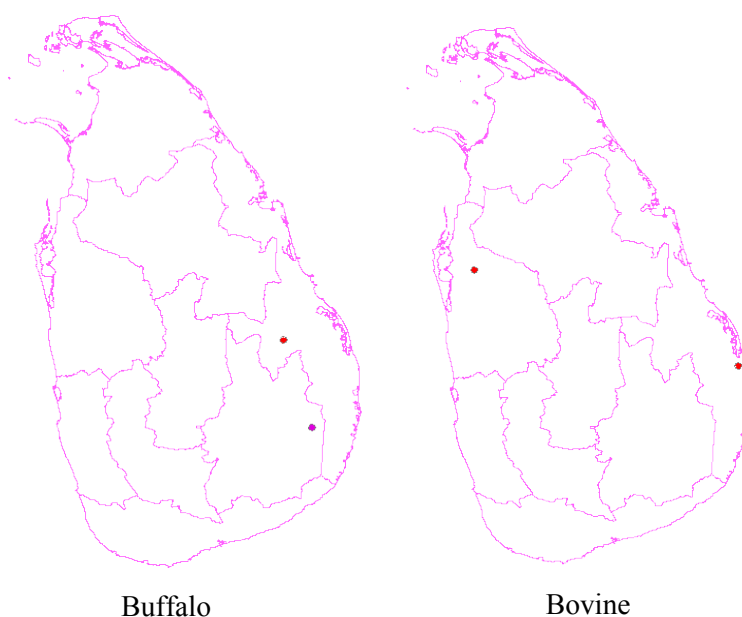
Pre-immunization of calves using a locally produced vaccine which has *B. bovis* and *B. bigemina* is being carried out in the country in selected farms for several years. This has been further extended to the field in 2011. During the first half of the year 2012, one hundred and twenty one (121) calves in Badulla district and forty (40) calves in Kandy district have been pre-immunized by the respective Veterinary Investigation Officers.



Month	Cases	Deaths
January	222	12
February	178	8
March	200	6
April	186	12
May	137	7
June	145	7

2.1.2 Reported cases of Foot and Mouth Disease :January – June 2012

Cases of FMD were detected among cattle at Samanathurai and Mahaoya Veterinary ranges in Ampara district and Karuwalagaswewa Veterinary range in Puttalam district during the first half of the year 2012. An outbreak was also detected among buffalo herd at Siyambalanaduwa Veterinary range at Monaragala District adjoining Ampara district boundary. Epithelial Samples collected in these outbreaks revealed that the field virus belong to the sero-type 'O' of the foot and mouth disease virus.



Province	VS Range	Cases	
		Cattle	Buffalo
North Western	Karuwalagaswewa	4	-
Eastern	Maha Oya	-	4
	Sammanturai	8	
Uva	Siyambalanduwa	-	240

2.1.3 Reported cases of Brucellosis : January – June 2012

Brucella abortus is one of the common cause of infectious abortion in cattle. Though the abortion storm encountered in the farm during the introduction of infection leads to significant loss felt by the farmers, subsequently it is overlooked since the infected cows give birth to live calves thereafter. Furthermore as the slaughter policy cannot be implemented in order to control brucellosis in Sri Lanka, S19 vaccination plays a major role in controlling the disease.

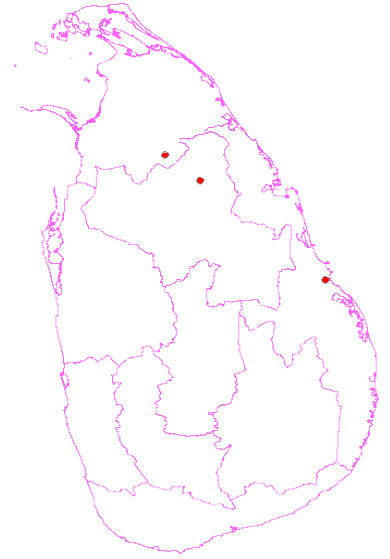
Brucella vaccine is locally produced and vaccination is carried out by the district Veterinary Investigation Officers with the assistance of field Veterinary Surgeons in areas where the prevalence of disease is well established by the laboratory findings. Vaccinated animals are identified by the animals identification system implemented in the country. Cattle in five district namely Anuradhapura, Chilaw, Nuwaraeliya, Polonnaruwa and Trincomalee have been vaccinated against brucellosis during the period under review.

A total of 1558 vaccinations have been carried out during first half of the year 2012.

District	No. of animals Vaccinated
Anuradhapura	583
Puttalam	93
Nuwara-Eliya	46
Polonnaruwa	700
Trincomalee	136
Total	1558

2.1.4 Reported cases of Black Quarter : January – June 2012

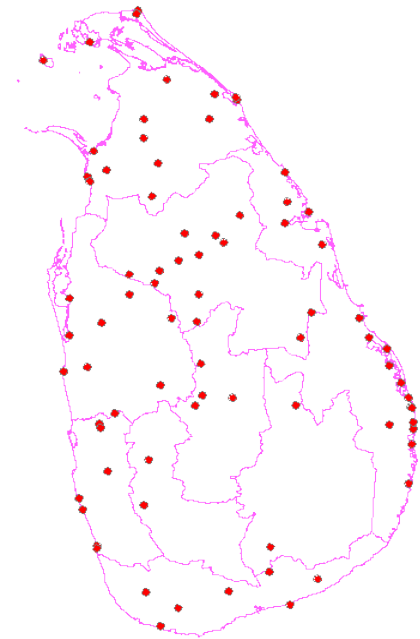
Black Quarter (BQ) appears to be the most fatal notifiable disease of cattle and buffaloes in the country. During first half of the year 2012, three isolated outbreaks were detected; Kiran Veterinary range at Batticalo District, Horowpathana Veterinary range at Anuradhapura district and Vavuniya Veterinary range at Vavuniya district. The overall case-fatality of the disease was 100%. Mass-scale preventive vaccination programme is carried out in the country biannually in identified locations specially in North-Central Province, North Western Province, Eastern Province and Northern Province in order to control the disease. In total 61213 animals have been vaccinated against Black Quarter during the period under review.



Province	VS Range	Cases	Death
Eastern	Kiran	8	8
North Central	Horowpothana	4	4
Northern	Vavuniya	15	15

2.2.1 Reported Cases of Contagious Pustular Dermatitis : January – June 2012

Contagious Pustular Dermatitis (CPD) is a highly contagious disease in small ruminant and it has been reported at most of the districts in the country. Veterinary Investigation Centers produce 'Auto Vaccine' against CPD which control the spread of the infection within the flocks. A total of 198 doses of CPD vaccine has been produced and used in 30 goat farms during the first half of the year 2012.



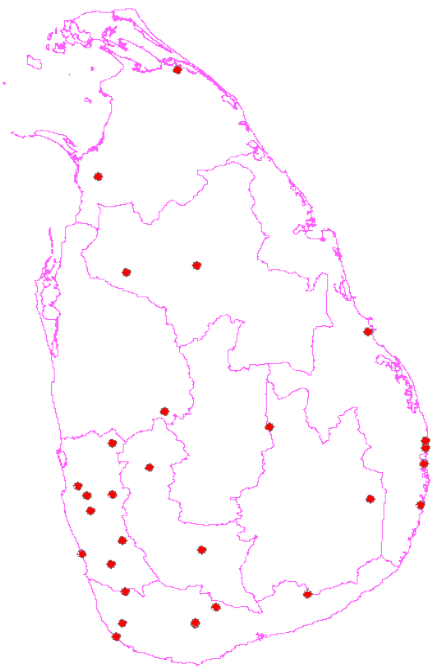
District	No. of farms
Anuradhapura	1
Badulla	11
Kandy	10
Polonnaruwa	2
Ratnapura	4
Trincomalee	2

Province	Cases	Deaths	District
Central	8	-	Matale, Kandy
Eastern	373	1	Ampara, Batticaloa, Trincomalee
North Central	190	8	Anuradhapura, Polonnaruwa
North Western	66	4	Kurunegala, Puttalam
Northern	165	6	Mullaitivu, Mannara, Kilinochchi, Vavuniya, Jaffna
Sabaragamuwa	57	-	Kegalle, Ratnapura
Southern	36	-	Galle, Hambantota, Matara
Uva	8	-	Monaragala, Badulla
Western	80	4	Colombo, Kalutara, Gampaha

2.3 Reported cases of Rabies : January – June 2012

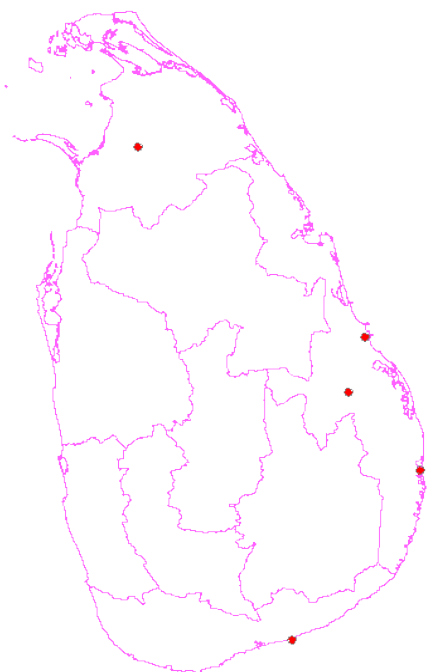
Rabies is an important disease of public health concern in addition to the fatality caused in affected animals. Though dogs remain as the major animal species contributing to the spread of rabies in the country the prevalence in other animal species including domestic cattle and goats appears significant and revealed by the passive surveillance in the Department of Animal Production and Health.

Cases of rabies among cattle has been recorded in all the provinces with high incidence in Western Province. A total of 73 cases has been recorded during the first half of the year which is more than twice number of cases recorded in dogs. Furthermore caprine cases too have been detected at Jaffna, Bactticalo, Ampara and Hambantota districts.

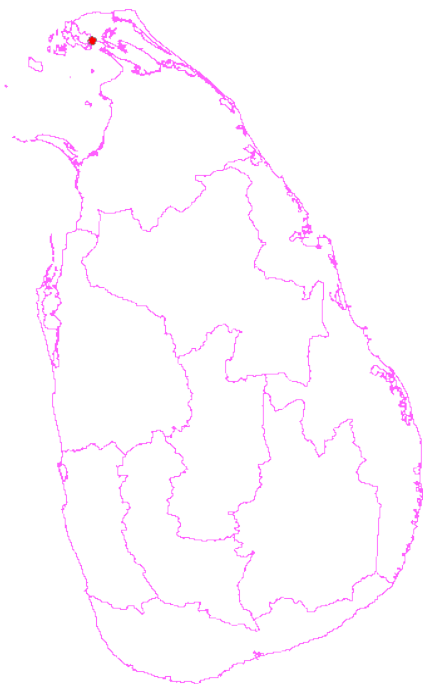


Bovine

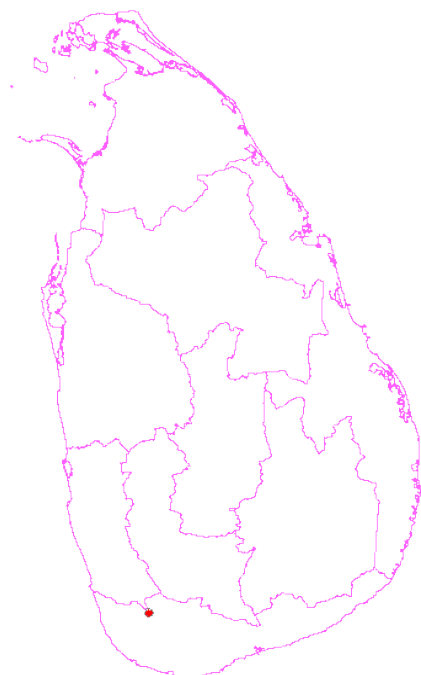
Species	Cases	Deaths
Bovine	73	73
Buffalo	1	1
Canine	30	30
Caprine	14	14



Caprine



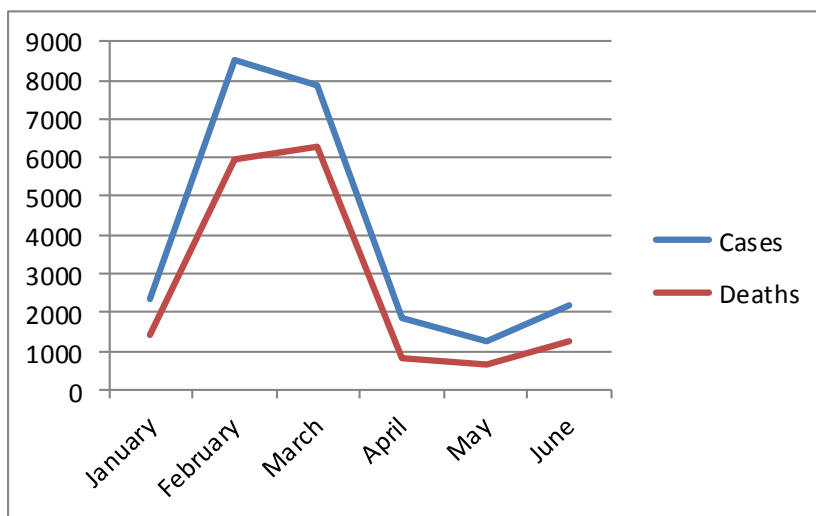
Canine



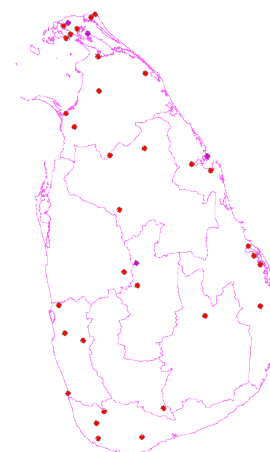
Buffalo

2.4.1 Reported Cases of Newcastle disease :- January – June 2012

Outbreaks of Newcastle disease were detected in all the Provinces during the period under review. Clinical cases of Newcastle disease were investigated by the relevant Veterinary Investigation Officers and laboratory confirmation was made by the Veterinary Research Institute, Peradeniya. Outbreaks were found to be extensively spreading in North Western Province, Eastern Province, Central Province, Western Province and Sabaragamuwa Province. The disease appears to be effectively controlled among commercial poultry population due to stringent vaccination regime adhered in most of the commercial farms. However the incidence in backyard poultry in which the preventive vaccination is rarely carried out remains as threat to the entire poultry population in the country. Vaccination in backyard poultry is generally neglected due to the non-availability of vaccine in small pack size. In order to overcome this, the Department of Animal Production and Health produces Newcastle Disease vaccine in 200 doses pack size and the vaccine is being issued to small-scale and back-yard poultry farmers free of charge via the Government Veterinary Surgeons. 2,885,400 doses of Newcastle disease vaccine has been issued for vaccination during the period of first half of the year 2012.

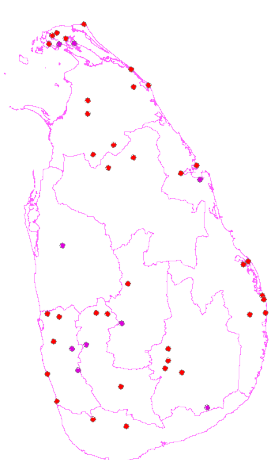


Province	Cases	Deaths
North Western	4831	3119
Eastern	3546	1567
Central	3468	2365
Western	3336	2591
Sabaragamuwa	3012	2808
Northern	2595	1482
Uva	1494	1220
North Central	1263	1137
Southern	443	45



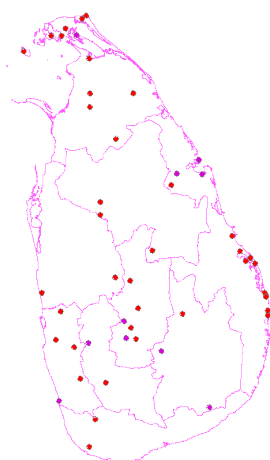
January

2376 cases
1432 deaths



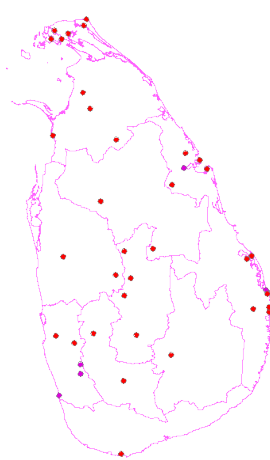
February

8499 cases
5947 deaths



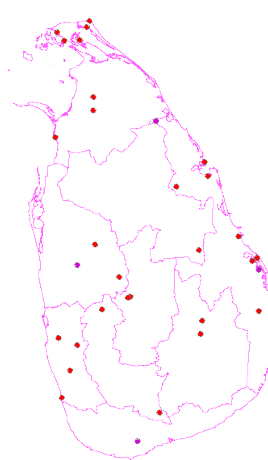
March

7848 cases
6259 deaths



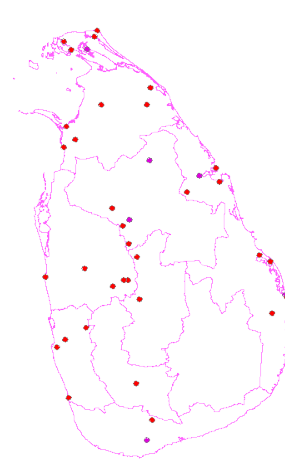
April

1839 cases
811 deaths



May

1267 cases
653 deaths

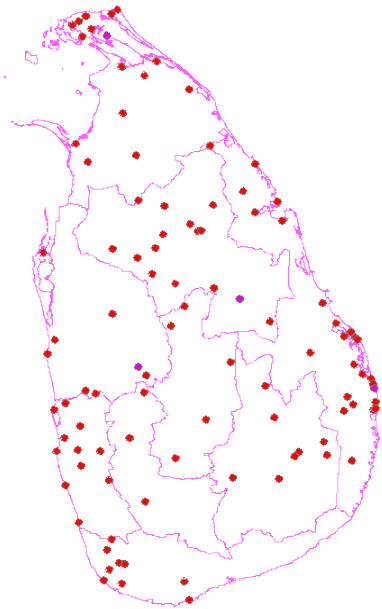


June

2159 cases
1232 deaths

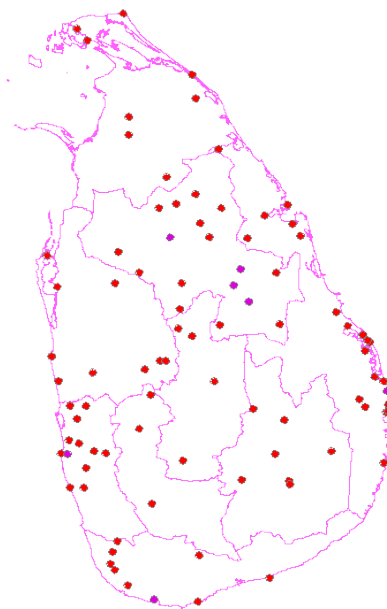
2.4.2 Reported cases of Fowl Pox : January – June 2012

A total number of 16,600 cases of Fowl Pox has been recorded during the first half of the year 2012 and overall case-fatality was found to be 1.6%. Monthly distribution of these cases have been shown below.



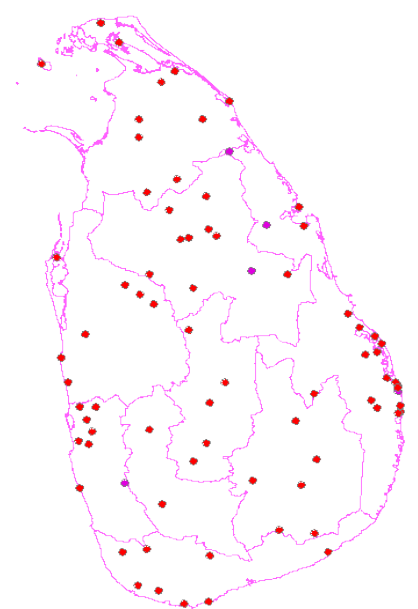
January

4719 cases
526 deaths



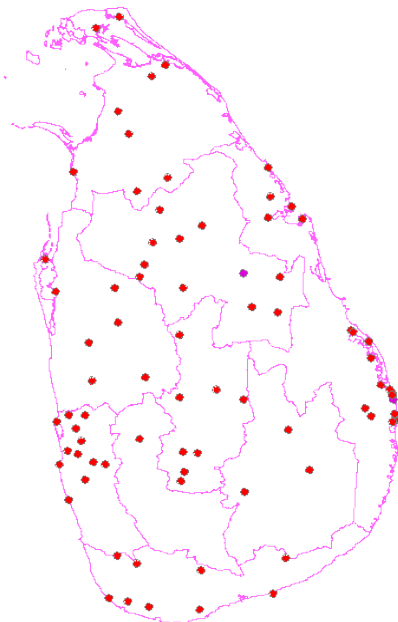
February

3833 cases
449 deaths



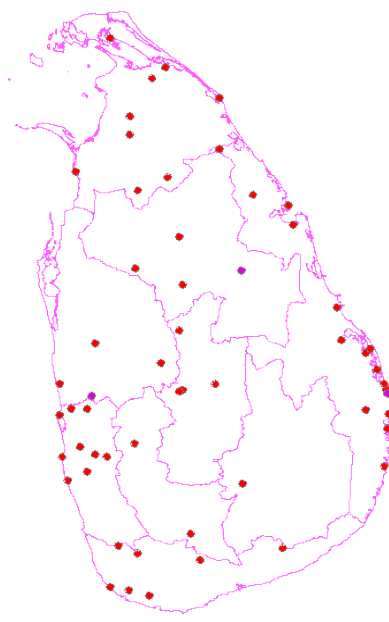
March

3341 cases
739 deaths



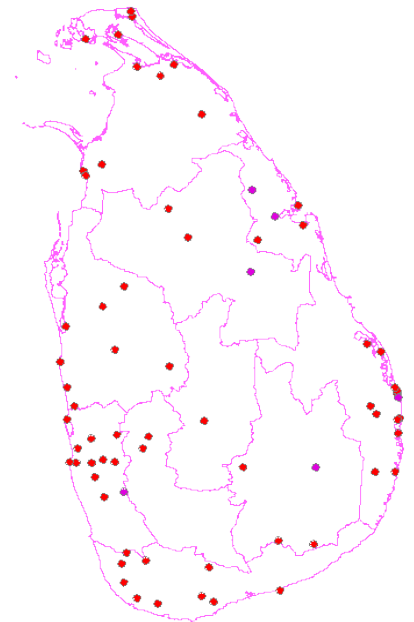
April

1638 cases
203 deaths



May

1173 cases
218 deaths



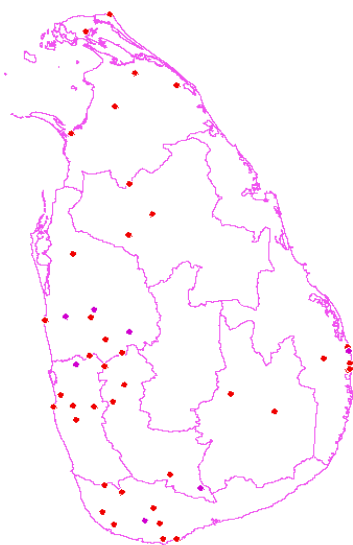
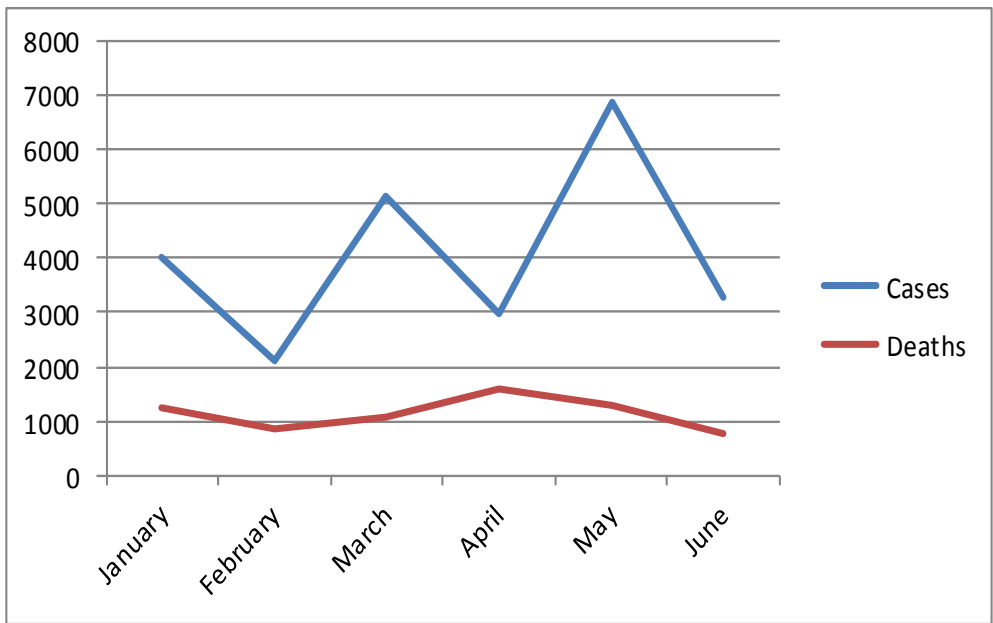
June

1896 cases
132 deaths

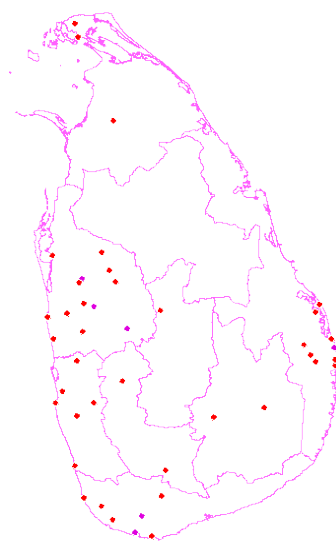
2.4.3 Reported cases of Infectious Bursal Disease : January – June 2012

Vaccination against IBD is carried out extensively in the country using the imported ‘killed’ or ‘live intermediate’ vaccine in order to protect the poultry farms. In addition to these vaccines ‘intermediate plus’ vaccine is also being imported in order to control the disease under specific circumstances in identified locations. These vaccines are imported under the user permit which allows importation of a stipulated quantity to be used in a prescribed manner under strict monitoring. Veterinary Drug Control Authority approval has been granted for eight user permits during the period under review in order to import a total of 5,413,000 doses of IBD ‘intermediate plus’ vaccine.

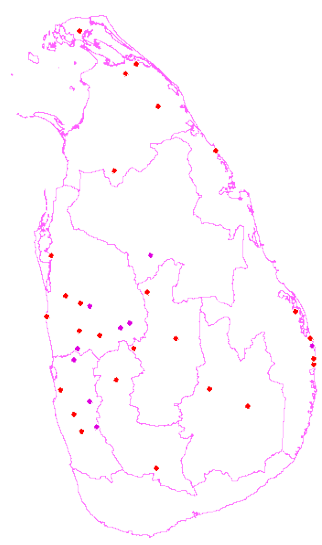
Monthly Distribution of IBD Cases: January — June 2012



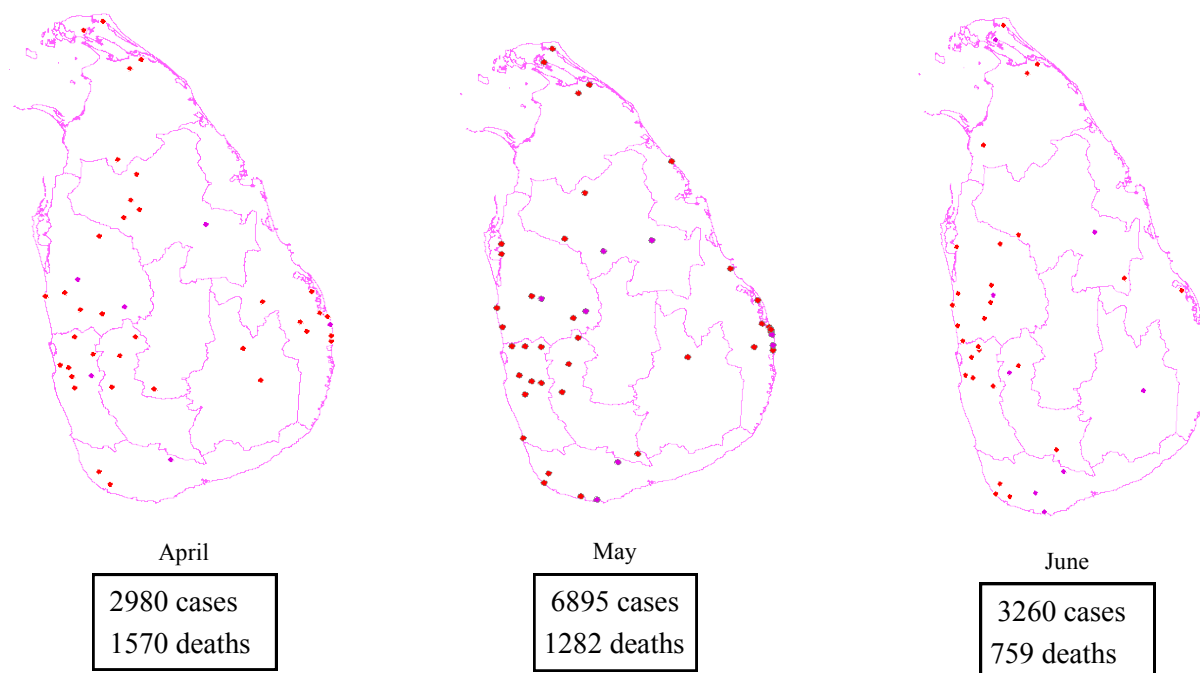
January
4030 cases
1237 deaths



February
2127 cases
847 deaths



March
5132 cases
1070 deaths



2.4.4 Salmonellosis : January – June 2012

Poultry Breeder farms in the country are subjected to Salmonella monitoring programme, regular slide agglutination test and hatchery testing. Twenty six Poultry Breeder farms are subjected to flock screening programme during the period under review and nine were found positive for the salmonella infection. Nineteen hatcheries were subjected to salmonella testing; salmonella was isolated from two hatcheries.

Poultry Breeders Farms where Flock Screening Programme was carried out in January - June 2012.

Nova Farm, Matale	Gayana Farm, Andigama	Marist Brother's Farm, Ja-Ela
Naugala Farm, Yatawatta	Miriswatta Farm, Horana	Ravi Farm, Ganemulla
Green Valley Farm, Maggona	Regional Hatchery, Achchuweli	Air Force Farm, Sigiriya
Pussella Farm, Kosgama	Regional Hatchery, Uppuweli	MLE Farm, Thambuttegama
Nishadini Farm, Radawana	Bairaha Farm, Urapola	NLDB Farm, Karandagolla
Three Acre Farm, Aswatte	Bairaha Farm, Kondaramulla	Uplands farm, Galaha
NLDB Farm, Marawila	Bairaha Farm, Hiripitiya	CPRS, Karandagolla
Three Star, Lunuwila	Bairaha Farm, Dolosbage	New Anthony's Farm, Ellakkala
SJS Poultry Breeder Farm, Bingiriya	Hansika Farm, Radawana	

3 Highly Pathogenic Avian Influenza

3.1 Highly Pathogenic Avian Influenza Surveillance; January - June 2012

Active surveillance against Highly Pathogenic Avian Influenza has been continued since year 2010 in the country. This included the sero - surveillance in commercial poultry and surveillance on migratory birds and backyard poultry. Thousand six hundred and thirty five (1635) serum samples, three hundred and fifteen pooled droppings and three hundred fifty three cloacal samples were collected representing all the district in the country during the first half of the year 2012. All the samples were detected as negative for the Highly Pathogenic Avian Influenza Virus which was confirm by the Animal Virus laboratory in Pollgolla.

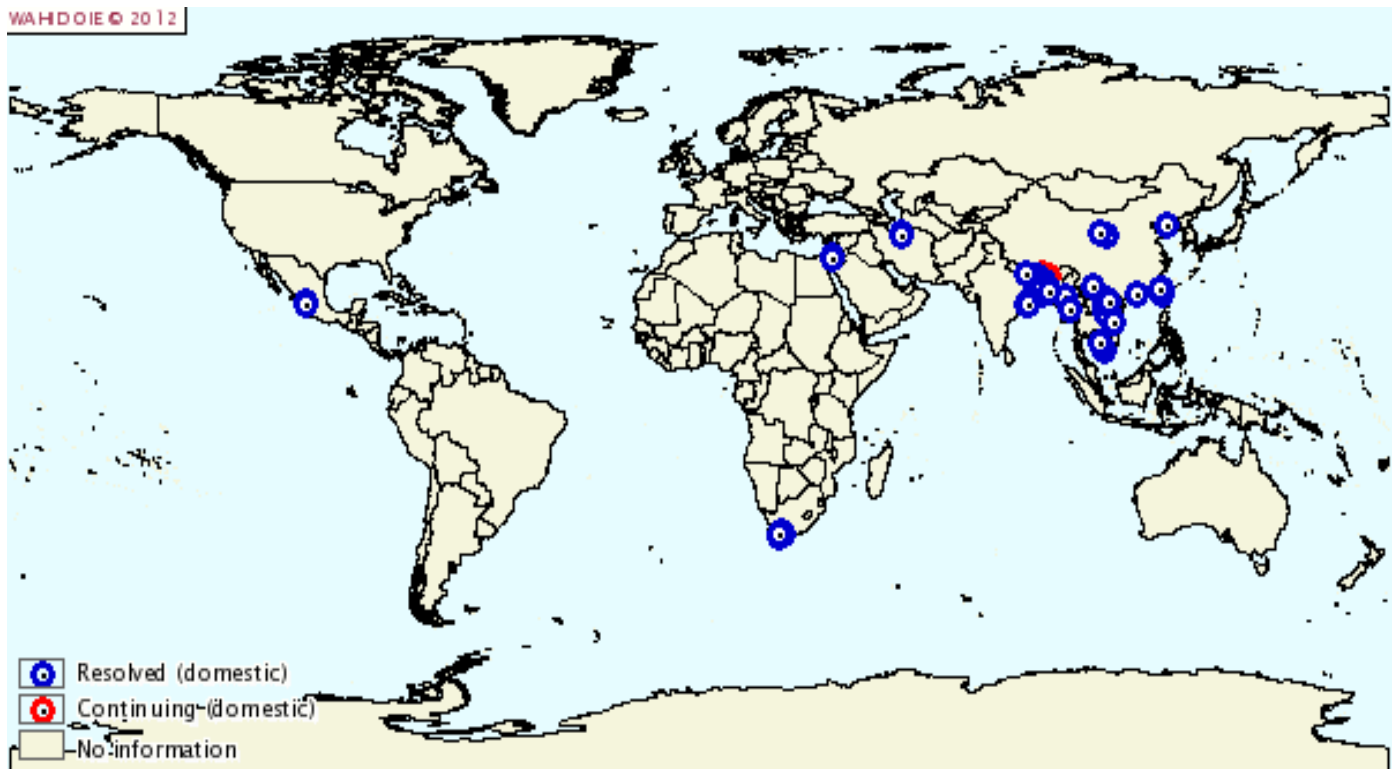
District	Serum samples (Commercial poultry)		Pooled dropping (Migratory birds)		Cloacal swabs (Backyards poultry)	
	No. tested for AIV	Results	No. tested for AIV	Results	No. tested for AIV	Results
Matara	45	02 (+)ve *	0	-	0	-
Hambantota	15	06 (+)ve *	60	(-)ve	10	(-)ve
Gampaha	45	01 (+)ve *	0	-	60	(-)ve
Kurunegala	255	37 (+)ve *	0	-	5	(-)ve
Puttlam	63	02 (+)ve *	6	(-)ve	94	(-)ve
Polonnaruwa	195	15 (+)ve *	67	(-)ve	0	-
Anuradhapura	45	03 (+)ve *	0	-	0	-
Kandy	184	31 (+)ve *	20	(-)ve	20	(-)ve
Nuwaraeliya	75	05 (+)ve *	0	-	0	-
Kegalle	15	(-)ve	0	-	0	-
Badulla	91	01 (+)ve *	41	(-)ve	0	-
Jaffna	75	(-)ve	85	(-)ve	150	(-)ve
Ampara	30	02 (+)ve *	24	(-)ve	0	-
Colombo	295	33 (+)ve *	12	(-)ve	14	(-)ve
Trincomalee	23	02(+)ve *	0	-	0	-
Matale	184	09 (+)ve *	0	-	0	-
Total	1635		315		353	

* All the AIV positives are negative for H5, H6, H7 and H9

Global Distribution of Notifiable Avian Influenza; January –June 2012

Virus Type	Country
H5N1	Bangladesh, Bhutan, Nepal, India, Myanmar, China, Chinese Taipei, Honkong, Cambodia, Vietnam,
H5N1	Chinese Taipei, South Africa
H7N1	South Africa
H7N3	Mexico

3.2 Global Situation of Highly Pathogenic Avian Influenza Outbreaks 2012



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