



# WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit  
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Vol. 38 No.48

26<sup>th</sup> November – 02<sup>nd</sup> December 2011

## Bovine TB: A thing of the past ? (Part I)

This is the first in a series of two articles on Bovine Tuberculosis. The first article describes the aetiology, distribution, clinical features and morbidity and mortality due to the disease. The second article will describe diagnosis, control and public health importance of the disease.

### Introduction

Bovine tuberculosis is a chronic bacterial disease of cattle that occasionally affects other species of mammals. This disease is a significant zoonosis that can spread to humans, typically by inhalation of aerosols or by ingestion of unpasteurized milk. In developed countries, eradication programmes have reduced or eliminated tuberculosis in cattle and human disease is now rare; however, reservoirs in wildlife can make complete eradication difficult. Bovine tuberculosis is still common in less developed countries and severe economic losses can occur from livestock deaths, chronic disease and trade restrictions. In some situations, this disease may also be a serious threat to endangered species.

### Pathogen

Bovine tuberculosis results from infection by *Mycobacterium bovis*, a Gram positive acid-fast bacterium in the *Mycobacterium tuberculosis* complex of the family Mycobacteriaceae.

### Species Affected

Cattle are the primary hosts for *M. bovis*, but other domesticated and wild mammals can also be infected. Known maintenance hosts include brush-tailed opossums (and possibly ferrets) in New Zealand, badgers in the United Kingdom and Ireland, bison and elk in Canada and kudu and African buffalo in southern Africa. White-tailed deer in the United States (Michigan) have been classified as maintenance hosts; however, some authorities

now believe this species may be a spillover host that maintains the organism only when its population density is high [Populations of spillover hosts do not maintain *M. bovis* indefinitely in the absence of maintenance hosts, but may transmit the infection between their members (or to other species) for a time. Some spillover hosts can become maintenance hosts if their population density is high].

Little is known about the susceptibility of birds to *M. bovis*, although they are generally thought to be resistant. Experimental infections have recently been reported in pigeons after oral or intra-tracheal inoculation and in crows after intra-peritoneal inoculation. Some avian species, including mallard ducks, appear to be resistant to experimental infection.

### Geographic Distribution

Although bovine tuberculosis was once found worldwide, control programmes have eliminated or nearly eliminated this disease from domesticated animals in many countries. Nations currently classified as bovine tuberculosis-free include Australia, Iceland, Denmark, Sweden, Norway, Finland, Austria, Switzerland, Luxembourg, Latvia, Slovakia, Lithuania, Estonia, the Czech Republic, Canada, Singapore, Jamaica, Barbados and Israel. Eradication programmes are in progress in other European countries, Japan, New Zealand, the United States, Mexico, and some countries of Central and South America. Although bovine tuberculosis has been eradicated from the majority of U.S. states, a few infected herds continue to be reported and a few states may periodically lose their disease-free status.

Bovine tuberculosis is still widespread in Africa, parts of Asia and some Middle Eastern countries.

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### Transmission

*M. bovis* can be transmitted by inhalation of aerosols, by ingestion or through breaks in the skin. The importance of these routes varies between species.

Bovine tuberculosis is usually maintained in cattle populations, but a few other species can become reservoir hosts. Most species are considered to be spillover hosts. Cattle shed *M. bovis* in respiratory secretions, faeces, milk and sometimes in urine, vaginal secretions or semen. Large numbers of organisms may be shed in the late stages of infection. Asymptomatic and anergic carriers occur. In most cases, *M. bovis* is transmitted between cattle via aerosols during close contact. Some animals become infected when they ingest the organism; this route may be particularly important in calves that nurse from infected cows. Cutaneous, genital and congenital infections have been seen but are rare. All infected cattle may not transmit the disease.

Ingestion appears to be the primary route of transmission in pigs, ferrets, cats and probably deer. In addition, cats can be infected by the respiratory route or via percutaneous transmission in bites and scratches. Nonhuman primates are usually infected by inhalation.

*M. bovis* can infect humans, primarily by the ingestion of unpasteurized dairy products but also in aerosols and through breaks in the skin. Raw or undercooked meat can also be a source of the organism. Person-to-person transmission is rare in immunocompetent individuals, but *M. bovis* has occasionally been transmitted within small clusters of people, particularly alcoholics or HIV-infected individuals. Rarely, humans have infected cattle via aerosols or urine.

*M. bovis* can survive for several months in the environment, particularly in cold, dark and moist conditions. At 12-24°C (54-75°F), the survival time varies from 18 to 332 days, depending on the exposure to sunlight. This organism is infrequently isolated from soil or pastures grazed by infected cattle. It appears to survive in natural pastures for, at most, a few weeks. In a recent study, *M. bovis* remained viable for 4 to 8 weeks in dry or moist soil samples in 80% shade [34°C (93°F)].

### Incubation Period

The symptoms of bovine tuberculosis usually take months to develop in cattle. Infections can also remain dormant for years and reactivate during periods of stress or in old age. Similarly, severe disease can develop in some deer within a few months of infection, while other deer do not become symptomatic for years.

### Clinical Signs

Tuberculosis is usually a chronic debilitating disease in cattle, but it can occasionally be acute and rapidly progressive. Early infections are often asymptomatic. In countries with eradication programmes, most infected cattle are identified early and symptomatic infections are uncommon. In late stages, common symptoms include progressive emaciation, a low-grade fluctuating fever, weakness and inappetance. Animals with pulmonary involvement usually have a moist cough that is worse in the morning, during cold weather or exercise and may have dyspnoea or

tachypnoea. In the terminal stages, animals may become extremely emaciated and develop acute respiratory distress. In some animals, retropharyngeal or other lymph nodes enlarge and may rupture and drain.

Greatly enlarged lymph nodes can also obstruct blood vessels, airways or the digestive tract. If the digestive tract is involved, intermittent diarrhoea and constipation may be seen. In some animals, the only symptom may be abscesses of unknown origin in isolated lymph nodes and symptoms may not develop for several years. In other cases, the disease may be disseminated, with a rapid, fulminating course.

In the abdominal form, enlarged mesenteric lymph nodes may be palpable. Skin infections are also common in cats and may appear as a soft swelling or flat ulcer, most often on the face, neck or shoulders. Draining fistulas or tracts may be seen. In some cats, bovine tuberculosis appears as a deformity of the forehead or bridge of the nose.

### Post Mortem Lesions

Bovine tuberculosis is characterized by the formation of granulomas (tubercles) where bacteria have localized. These granulomas are usually yellowish and either caseous, caseo-calcareous or calcified. They are often encapsulated. In some species such as deer, the lesions tend to resemble abscesses rather than typical tubercles. Some tubercles are small enough to be missed by the naked eye, unless the tissue is sectioned. In cattle, tubercles are found in the lymph nodes, particularly those of the head and thorax. They are also common in the lung, spleen, liver and the surfaces of body cavities. In disseminated cases, multiple small granulomas may be found in numerous organs. Lesions are sometimes found on the female genitalia, but are rare on the male genitalia. In countries with good control programmes, infected cattle typically have few lesions at necropsy. Most of these lesions are found in lymph nodes associated with respiratory system. However, small lesions can often be discovered in the lungs of these animals if the tissues are sectioned.

### Morbidity and Mortality

In countries with control programmes, bovine tuberculosis is often confined to one or two animals in a herd. In two studies on transmission from naturally infected reactor cattle, 0-40% of susceptible contacts became infected and 0-10% developed gross lesions. The severity of the disease varies with the dose of infectious organisms and individual immunity. Infected animals may remain asymptomatic, become ill only after stress or in old age, or develop a chronic, debilitating fatal disease. In developed countries, most reactors are detected during routine testing and mortality from tuberculosis is rare.

### Source

*Bovine Tuberculosis, available from*  
[www.cfsph.iastate.edu/Factsheets/pdfs/bovine\\_tuberculosis.pdf](http://www.cfsph.iastate.edu/Factsheets/pdfs/bovine_tuberculosis.pdf)

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

**Table 1: Vaccine-preventable Diseases & AFP** **19<sup>th</sup> – 25<sup>th</sup> November 2011 (47<sup>th</sup> Week)**

Disease	No. of Cases by Province									Number of cases during current week in 2011	Number of cases during same week in 2010	Total number of cases to date in 2011	Total number of cases to date in 2010	Difference between the number of cases to date in 2011 & 2010
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	01	00	00	00	00	00	00	00	01	01	79	77	+ 02.6 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	00	00	00	01	00	00	01	00	124	88	+ 40.9 %
Tetanus	00	00	00	00	00	00	00	00	00	00	01	24	22	+ 18.2 %
Whooping Cough	00	00	00	01	00	00	00	00	00	01	00	51	30	+ 70.0 %
Tuberculosis	59	43	00	05	10	09	01	01	11	139	270	8654	9311	- 07.0 %

**Table 2: Newly Introduced Notifiable Disease** **19<sup>th</sup> – 25<sup>th</sup> November 2011 (47<sup>th</sup> Week)**

Disease	No. of Cases by Province									Number of cases during current week in 2011	Number of cases during same week in 2010	Total number of cases to date in 2011	Total number of cases to date in 2010	Difference between the number of cases to date in 2011 & 2010
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	13	09	07	00	01	09	02	33	12	91	56	3897	3121	+ 24.9 %
Meningitis	03 GM=1 KL=2	04 ML=3 NE=1	01 MT=1	00	00	03 KG=2 PU=1	03 AP=2 PO=1	00	04 RP=3 KG=1	18	18	804	1460	- 44.9 %
Mumps	08	06	10	03	03	03	09	06	25	73	18	3029	1100	+ 175.4 %
Leishmaniasis	00	01 ML=1	38 HB=38	00	00	02 KN=2	17 AP=12 PO=5	00	01 RP=1	59	08	629	366	+ 71.8 %

**Key to Table 1 & 2**

**Provinces:** W: Western, C: Central, S: Southern, N: North, E: East, NC: North Central, NW: North Western, U: Uva, Sab: Sabaragamuwa.  
**DPDHS Divisions:** CB: Colombo, GM: Gampaha, KL: Kalutara, KD: Kandy, ML: Matale, NE: Nuwara Eliya, GL: Galle, HB: Hambantota, MT: Matara, JF: Jaffna, KN: Killinochchi, MN: Mannar, VA: Vavuniya, MU: Mullaitivu, BT: Batticaloa, AM: Ampara, TR: Trincomalee, KM: Kalmunai, KR: Kurunegala, PU: Puttalam, AP: Anuradhapura, PO: Polonnaruwa, BD: Badulla, MO: Moneragala, RP: Ratnapura, KG: Kegalle.

**Data Sources:**

**Weekly Return of Communicable Diseases:** Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

**Special Surveillance:** Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008. .

**Dengue Prevention and Control Health Messages**

**Thoroughly clean the water collecting tanks bird baths, vases and other utensils once a week to prevent dengue mosquito breeding.**

**Table 4: Selected notifiable diseases reported by Medical Officers of Health**  
19<sup>th</sup> – 25<sup>th</sup> November 2011 (47<sup>th</sup> Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	162	8677	3	177	1	7	4	302	0	60	16	462	0	8	0	67	0	2	85
Gampaha	54	3610	3	125	0	19	1	93	0	83	11	506	1	26	3	364	0	6	67
Kalutara	14	1209	5	155	0	10	0	79	0	26	4	367	0	4	2	19	0	1	83
Kandy	42	1285	13	383	0	7	1	40	0	40	5	171	1	103	0	53	0	0	91
Matale	5	309	4	197	0	4	1	36	0	27	4	159	1	16	0	12	0	0	100
Nuwara	8	227	2	319	0	4	1	59	0	27	0	50	0	65	2	33	0	1	77
Galle	15	781	2	107	0	7	0	31	0	154	2	214	0	43	0	11	0	5	74
Hambantota	7	377	5	66	0	4	0	5	0	28	2	494	1	62	1	16	0	1	92
Matara	40	616	4	92	0	3	2	22	0	29	3	361	3	85	1	25	0	1	100
Jaffna	9	326	27	378	0	3	19	294	0	32	0	2	4	208	2	34	0	1	91
Kilinochchi	0	58	0	40	0	3	0	12	0	92	0	2	0	13	0	3	0	0	0
Mannar	2	51	2	26	0	1	0	33	0	14	0	13	1	34	0	2	0	0	100
Vavuniya	2	74	0	40	1	15	0	10	2	83	1	46	0	2	1	3	0	0	100
Mullaitivu	1	18	0	68	0	1	0	7	0	60	0	7	0	2	0	3	0	0	50
Batticaloa	58	1027	0	577	0	5	0	7	0	9	0	28	0	3	0	2	0	7	71
Ampara	5	160	3	233	0	1	0	11	0	32	0	59	0	2	0	11	0	0	43
Trincomalee	0	153	9	666	0	2	1	11	0	55	1	97	0	8	1	9	0	1	75
Kurunegala	10	897	8	351	2	14	1	96	1	12	21	1547	0	77	3	71	0	4	91
Puttalam	8	467	3	184	0	2	0	33	0	90	1	122	0	18	0	11	0	2	67
Anuradhapu	5	263	5	146	0	2	1	6	0	51	1	243	0	17	0	28	0	1	79
Polonnaruw	2	270	2	123	0	1	0	14	0	35	0	84	0	1	7	24	0	0	86
Badulla	12	579	14	378	0	6	1	57	0	22	0	77	3	86	0	67	0	0	88
Monaragala	6	276	1	141	1	5	2	45	0	24	1	183	0	76	3	95	0	0	91
Ratnapura	25	976	10	486	1	9	3	58	16	13	15	592	0	3	3	80	2	4	83
Kegalle	14	917	2	114	0	12	2	79	0	44	5	338	0	35	16	299	0	0	82
Kalmune	1	40	22	590	0	0	0	5	0	24	0	7	0	2	0	3	0	1	69
<b>SRI LANKA</b>	<b>507</b>	<b>23643</b>	<b>149</b>	<b>6162</b>	<b>06</b>	<b>147</b>	<b>40</b>	<b>1445</b>	<b>19</b>	<b>106</b>	<b>93</b>	<b>6231</b>	<b>15</b>	<b>1026</b>	<b>45</b>	<b>1345</b>	<b>02</b>	<b>38</b>	<b>81</b>

Source: Weekly Returns of Communicable Diseases WRCD).

\*Dengue Fever / DHF refers to Dengue Fever / Dengue Haemorrhagic Fever.

\*\*Timely refers to returns received on or before 25<sup>th</sup> November, 2011 Total number of reporting units =329. Number of reporting units data provided for the current week: 267

A = Cases reported during the current week. B = Cumulative cases for the year.

**PRINTING OF THIS PUBLICATION IS FUNDED BY THE WORLD HEALTH ORGANIZATION (WHO).**

Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to [chepid@sltnet.lk](mailto:chepid@sltnet.lk).

**ON STATE SERVICE**

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