WEEKLY EPIDEMIOLOGICAL REPORT

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WER SRI LANKA - 2011

Vol. 38 No.49 **03rd – 09th December 2011**

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

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

Diagnosis

Clinical

Tuberculosis can be difficult to diagnose based only on the clinical signs. In developed countries, few infections become symptomatic; most are diagnosed by routine testing or found at the slaughterhouse.

Differential diagnosis

The differential diagnosis includes contagious bovine pleuropneumonia, *Pasteurella* or *Corynebacterium pyogenes* pneumonia, aspiration pneumonia, traumatic pericarditis, caseous lymphadenitis or melioidosis in small ruminants and chronic aberrant liver fluke infestation.

Laboratory tests

In live cattle, tuberculosis is usually diagnosed in the field with the tuberculin skin test. In this test, tuberculin is injected intradermally; a positive test is indicated by a delayed hypersensitivity reaction (swelling). The tuberculin test can be performed using bovine tuberculin alone or as a comparative test that distinguishes reactions to *M. bovis* from reactions to environmental mycobacteria.

The U.S. uses the caudal fold (bovine tuberculin) test for the preliminary screening of cattle; reactors are re-tested with the comparative cervical test [The test is performed by the intradermal injection of biologically balanced bovine PPD tuberculin and avian PPD tuberculin at separate cites in the cervical area. A determination as to the possible presence of bovine tuberculosis is made by comparing the responses of the two tuberculins 72 hours (+/- 6 hrs) following injection]. False negative responses are sometimes seen soon after infection, in the late stages of the disease, in animals with poor immune responses and in those that have recently calved.

A presumptive diagnosis can also be made by histopathology and/or microscopic demonstration of acid-fast bacilli. Direct smears from clinical samples or tissues may be stained with the Ziehl-Neelsen stain, a fluorescent acid-fast stain or immunoperoxidase techniques. The diagnosis is confirmed by the isolation of *M. bovis* on selective culture media. Mycobacteria grow slowly and cultures are incubated for eight weeks; growth usually becomes visible in 3 to 6 weeks. The identity of the organism can be confirmed with biochemical tests and culture characteristics or polymerase chain reaction (PCR) assays. PCR can also detect *M. bovis* directly in clinical samples. Genetic fingerprinting techniques (e.g. spoligotyping) can distinguish different strains of *M. bovis*. Animal inoculation is rarely done, but may be necessary if the histopathology suggests tuberculosis and cultures are negative. All procedures for bacterial culture should be done in a biological safety cabinet, as the bacteria may survive in heat-fixed smears or become aerosolized during specimen preparation.

Other assays are typically used as ancillary tests to the tuberculin test.

e.g. lymphocyte proliferation and gamma interferon assays, Enzyme-linked immune sorbent assays(ELISA) to detect antibodies etc.

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Samples to collect

Bovine tuberculosis is a zoonotic disease; samples should be collected, handled and shipped with all appropriate precautions. The tuberculin test is the standard method of diagnosis in live cattle and cervids and the prescribed test for international trade. Occasionally, the sputum and other body fluids may be collected from live animals for microbiological examination. Blood samples may also be taken for the gamma interferon or lymphocyte proliferation tests and serum can be collected for ELISA.

Samples for the gamma interferon test must be transported to the laboratory promptly, as this test must be started within 24 to 30 hours of blood collection. At necropsy, samples for culture should be collected from abnormal lymph nodes and affected organs such as the lungs, liver and spleen. These samples should be collected into clean, preferably sterile, containers; environmental mycobacteria grow more rapidly than *M. bovis* and contamination with these organisms can cause false negatives. Specimens should be shipped to the laboratory quickly; prompt shipment maximizes the chance of isolating *M. bovis*. If shipping must be delayed, the samples can be refrigerated or frozen. If refrigeration or freezing is not feasible, 0.5% (w/v) boric acid may be added for periods of a week or less. Specimens should also be collected for histopathology.

Control

Bovine tuberculosis can be controlled by test-and slaughter or test-and-segregation methods. Affected herds are re-tested periodically to eliminate cattle that may shed the organism; the tuberculin test is generally used. Infected herds are usually quarantine and animals that have been in contact with reactors are traced. Only test-and-slaughter techniques are guaranteed to eradicate tuberculosis from domesticated animals. However, some countries use test and-segregation programs during the early stages of eradication and switch to test-and-slaughter methods in the final stage. Once eradication is nearly complete, slaughter surveillance with tracing of infected animals may be a more efficient use of resources. Sanitation and disinfection may reduce the spread of the agent within the herd. *M. bovis* is relatively resistant to disinfectants and requires long contact times for inactivation. Effective disinfectants include 5% phenol, iodine solutions with a high concentration of available iodine, glutaraldehyde and formaldehyde. In environments with low concentrations of organic material, 1% sodium hypochlorite with a long contact time is also effective. *M. bovis* is also susceptible to moist heat of 121°C (250°F) for a minimum of 15 minutes. Rodent control may also be advisable on affected farms.

The occurrence of *M. bovis* in wildlife reservoir hosts complicates eradication efforts. Culling to reduce the population density can decrease transmission. However, each situation must be assessed individually.

Barriers can be used around hay storage areas to prevent wildlife access. In addition, bio security measures on farms decrease interactions between wildlife and domesticated animals.

Effective bovine tuberculosis vaccines are not currently available for cattle. New vaccines are being developed and tested, particularly for wildlife reservoirs.

Antimicrobial treatment has been attempted in some species, but the treatment must be long term and clinical improvement can occur without bacteriological cure. The risk of shedding organisms, hazards to humans and potential for drug resistance make treatment controversial.

Public Health Importance

Human tuberculosis due to *M. bovis* has become very rare in countries with pasteurized milk and bovine tuberculosis eradication programs. However, this disease continues to be reported from areas where bovine disease is poorly controlled. The incidence is higher in farmers, abattoir workers and others who work with cattle. In addition, humans can be infected by exposure to other species; documented infections have occurred from goats, seals, farmed elk and a rhinoceros. Wildlife may be a source of infection, particularly in countries where bush meat is eaten.

Some human infections are asymptomatic. In other cases, localized or disseminated disease can develop either soon after infection or many years later when waning immunity allows the infection to reactivate. Localized disease can affect lymph nodes, skin, bones and joints, genitourinary system, meninges or respiratory system. Cervical lymphadenopathy (scrofula), which primarily affects the tonsillar and pre-auricular lymph nodes, was once a very common form of tuberculosis in children who drank infected milk. In some cases, these lymph nodes rupture and drain to the skin; chronic skin disease (lupus vulgaris) may occasionally result. Humans infected through the skin can develop localized skin disease ("butcher's wart"), a form usually thought to be benign and self limiting.

Pulmonary disease is more common in people with reactivated infections than an initial infection; the symptoms may include fever, cough, chest pain, cavitation and hemoptysis. Genitourinary disease can result in kidney failure. Bovine tuberculosis can be treated successfully with antimicrobial drugs (*M. bovis* is innately resistant to pyrazinamide: therefore the standard treatment is isoniazid and rifampicin for 9 months) but untreated infections may be fatal.

Source

Bovine Tuberculosis, available from
www.cfsph.iastate.edu/Factsheets/pdfs/bovine_tuberculosis.pdf

Compiled by Dr. Madhava Gunasekera of the Epidemiology Unit

Table 1: Vaccine-preventable Diseases & AFP

29th November – 02nd December 2011 (48th 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	03	00	00	00	00	00	00	00	03	00	82	77	+ 06.5 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	00	00	00	00	00	00	00	00	125	88	+ 42.0 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	24	22	+ 18.2 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	51	30	+ 70.0 %
Tuberculosis	71	14	03	24	12	23	17	41	34	239	124	8893	9435	- 05.7 %

Table 2: Newly Introduced Notifiable Disease

29th November – 02nd December 2011 (48th 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	03	09	02	10	03	12	06	04	62	46	3966	3176	+ 23.7 %
Meningitis	03 GM=1 MT=1 HB=1	00	02 GL=1 HB=1	01 MN=1	01 TR=1	04 KG=4	04 AP=4	01 BD=1	01 RP=1	17	22	827	1483	- 46.1 %
Mumps	13	06	06	00	30	13	19	05	17	109	47	3156	1149	+ 171 %
Leishmaniasis	00	01 KD=1	10 HB=9 MT=1	00	00	00	14 AP=12 PO=2	00	05 RP=5	30	13	636	381	+ 66.9 %

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

To prevent dengue, remove mosquito breeding places in and around your home, workplace or school once a week.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

29th November – 02nd December 2011 (48th 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	188	8889	3	180	0	7	14	317	3	63	20	482	0	8	0	69	0	2	**85**
Gampaha	109	3769	3	129	0	19	4	99	1	84	8	519	0	26	5	372	0	6	**60**
Kalutara	33	1252	1	15	0	10	3	84	0	26	5	373	0	4	1	20	0	1	**67**
Kandy	94	1379	1	386	0	7	0	40	0	40	3	174	0	103	0	53	0	0	**87**
Matale	12	321	3	200	0	4	0	36	0	27	4	163	1	17	0	12	0	0	**83**
Nuwara	1	228	3	323	0	4	0	59	0	154	1	51	2	69	0	33	0	1	**92**
Galle	14	800	1	108	0	7	1	32	0	28	5	221	0	43	0	11	0	5	**79**
Hambantota	6	383	2	68	0	4	0	5	1	30	4	499	0	62	1	17	1	2	**83**
Matara	48	664	6	98	0	3	0	22	0	32	6	367	6	91	3	28	0	1	**100**
Jaffna	9	335	18	398	0	3	10	307	0	92	0	2	4	212	2	36	0	1	**100**
Kilinochchi	0	59	0	40	0	3	2	14	0	14	0	2	0	13	0	3	0	0	**100**
Mannar	0	51	4	30	0	1	3	36	0	83	0	13	0	34	0	2	0	0	**100**
Vavuniya	0	74	3	43	1	16	2	12	0	60	0	46	0	2	0	3	0	0	**75**
Mullaitivu	0	18	0	69	0	1	0	7	0	9	0	7	0	2	0	3	0	0	**0**
Batticaloa	102	1134	3	581	0	5	0	7	0	32	0	28	0	3	0	2	1	8	**86**
Ampara	6	168	6	246	0	1	0	11	0	55	3	62	0	2	0	11	0	0	**100**
Trincomalee	9	162	11	680	0	2	0	11	0	12	3	101	0	9	0	9	0	1	**83**
Kurunegala	22	919	6	358	0	14	2	98	0	90	6	1553	0	77	2	73	0	4	**78**
Puttalam	10	479	4	188	0	2	1	34	0	51	0	122	0	18	0	11	0	2	**58**
Anuradhapu	6	271	8	154	0	2	0	6	0	35	0	243	0	17	0	28	0	1	**74**
Polonnaruw	9	279	0	123	0	1	2	16	0	22	0	84	0	1	1	25	0	0	**71**
Badulla	12	591	8	387	0	6	0	57	0	24	3	80	2	88	0	67	0	0	**88**
Monaragala	2	278	6	147	0	5	0	45	0	14	1	184	1	77	1	96	0	0	**91**
Ratnapura	25	1001	2	488	0	9	2	60	0	44	4	598	0	30	1	82	0	2	**72**
Kegalle	36	958	1	115	0	12	2	81	1	25	6	344	0	35	20	320	0	0	**100**
Kalmune	2	42	12	604	0	1	0	5	1	107	0	7	0	2	1	4	0	1	**62**
SRI LANKA	**755**	**24514**	**115**	**6299**	**01**	**149**	**48**	**1501**	**07**	**1253**	**82**	**6325**	**16**	**1045**	**38**	**1390**	**02**	**38**	**81**

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 02nd December, 2011 Total number of reporting units =329. Number of reporting units data provided for the current week: 265
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.**

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