

## Enhanced pilot surveillance program for anthrax in livestock species in north-west Bangladesh

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### Introduction

Control of the re-emerging zoonotic disease anthrax is essential for the safety of human health and to sustain the livestock economy. The existing anthrax surveillance programme implemented by the Department of Livestock services is not sufficient for disease control purposes due skilled manpower shortages and a lack of support services.

This study was conducted to evaluate an enhanced reporting system for animal anthrax cases in comparison to the existing surveillance programme. The purpose of adopting the enhanced surveillance was to enable more accurate estimations of the true incidence of anthrax. To do this help was requested from village volunteers, and a joint collaboration was entered into by the animal and human health services in the rural risk areas where repeated cases were previously reported. This study aimed to measure the effectiveness of the volunteers and the implementation of the One Health approach in terms of enhancing anthrax surveillance.

### Objectives

- Improve reporting of anthrax cases to more accurately reflect the true incidence in livestock.
- Evaluate reporting of anthrax cases in livestock species in both the enhanced surveillance program and the existing program.
- Independently assess the effectiveness of village volunteers in conducting animal disease surveillance, in general, and anthrax detection, in particular.

### Methods

In this study, 465 villages from 20 unions under five upazilas (sub-districts) of five districts in North West Bangladesh were selected for the enhanced surveillance programme and village volunteers were chosen from the selected villages. The enhanced surveillance system operated from May to September 2013. Within each upazila, up to eight unions were selected. The enhanced surveillance program was introduced into half of the selected unions in each upazila, and the other four unions maintained the pre-existing surveillance arrangements.

The study was launched with a series of initial orientation meetings held with local officers from both human and livestock health services.

Village surveillance volunteers were identified in each union by exchanging ideas with the village head and the union chairman. Further meetings were held for the volunteers and all members of the enhanced surveillance network to train them to recognise and report suspected anthrax cases in different livestock species.



Figure 1. Volunteers attending an upazila level training programme about recognising and reporting suspected anthrax cases in village livestock.

The volunteers were asked to visit village households regularly to remind families to contact them if they found a suspect case. The volunteers reported these cases to the Upazila Livestock Officers (ULOs). To encourage reporting, the volunteers were given cell phone credit and incentives for all laboratory-confirmed cases.

The ULO or Veterinary Surgeon would visit a suspect case, record necessary information in a prescribed manner, prepare and fix a blood smear from the ear vein of the diseased animal. Microscopic examination was done in district and central disease investigation laboratories.

At the end of the 5-month study period, a cross-sectional evaluation survey was conducted by University students using 200 randomly selected households: 100 were from villages where the enhanced surveillance had been conducted, and 100 from villages where the existing surveillance program was continued.

### Results

A total of 310 suspected anthrax cases were recorded; of which, only 22 cases were confirmed by either laboratory testing or tracing epidemiological links of human anthrax cases (Table 1). Most of the cases occurred during July–August. Among confirmed cases, 18 were acute and four were per-acute. Young animals and goats were mainly affected. Recorded clinical signs were congested mucosa, unclotted blood, blood discharging through natural openings, high temperature, convulsion, muscle tremor, listlessness, dyspnoea and depression.

Table 1. Distribution of volunteer-reported suspected and confirmed animal anthrax cases according to upazila and livestock species in north-west districts of Bangladesh.

District	Upazila	No. of suspected anthrax cases reported		No. of confirmed anthrax cases (% reported cases)	
		Cattle	Goats	Cattle	Goats
Bogra	Bogra sadar	48	2	1 (2%)	0
Khushtia	Doulatpur	28	15	0	0
Meherpur	Gangni	40	30	5 (13%)	12 (40%)
Pabna	Santhia	59	3	0	0
Sirajganj	Shahjadpur	79	6	4 (5%)	0
<b>Total</b>		<b>254</b>	<b>56</b>	<b>10 (4%)</b>	<b>12 (21%)</b>

The 2013 rate of reporting of suspected anthrax cases significantly increased with the intervention of village volunteers in the enhanced surveillance programme as compared with earlier years (Table 2). Vaccinators and animal village doctors appeared to perform better than any other types of volunteers.

Table 2. Numbers of suspected cattle anthrax cases/1000 cattle reported to the Upazila Livestock Offices in the intervention (I) and non-intervention (NI) unions of five upazila in north-west Bangladesh.

Upazila	Union <sup>1</sup>	No. cattle <sup>2</sup>	No. suspected cases of cattle anthrax / 1000 cattle			
			2010	2011	2012	2013 <sup>3</sup>
Bogra Sadar	I	20,095	0.35	0.05	0.55	1.64
	NI	19,352	0.26	0.31	0.41	0.21
Doulatpur	I	12,445	1.93	0.16	0.64	1.12
	NI	10,711	1.31	0.28	0.47	0.56
Gangni	I	25,682	0.31	0.55	0.78	0.82
	NI	23,885	0.25	0.25	0.46	0.42
Santhia	I	52,205	0.29	0.23	0.33	0.77
	NI	45,472	0.20	0.15	0.18	0.24
Shahjadpur	I	95,358	0.19	0.30	0.39	0.52
	NI	85,296	0.18	0.19	0.21	0.25

<sup>1</sup> I: Intervention unions, NI: Non-intervention unions;

<sup>2</sup> Cattle population (DLS, 2012); <sup>3</sup> May–Sept only.

In the evaluation study, most farmers (95%) in the intervention areas reported that village volunteers visited their households, of which around 50% volunteers followed the defined schedule of visiting each household once or twice per week.

## Discussion

Although the rate of reported suspect anthrax cases increased under the programme, the rate of confirmed cases was very low, particularly in cattle. Therefore, the initial screening of suspected cases should be assessed carefully in future to save laboratory and other costs.

A high proportion of suspected anthrax cases were reported in goats, with a higher proportion confirmed as anthrax compared to cattle. In the past most confirmed anthrax cases have occurred in cattle, and cattle had been considered as the

more susceptible species. This finding indicates that the previous apparently low incidence of anthrax in goats may be due to under-reporting rather than a lower susceptibility to anthrax. The greater number of cases occurring in young animals may be due to a lack of immunological defence.

Collaboration of human anthrax study, which was conducted in the same districts, has helped identify some animal cases using epidemiological link of human cases.

## Lessons learned

- Cross-sectoral collaboration (in particular with human health) is more effective in investigation of zoonotic disease like anthrax.
- Functional links between the government departments and academic institutes, like Chittagong Veterinary and Animal Sciences University and Massey University, helped to build capacity and capability of department personnel during the research programme. The international exposure through this programme is very useful.
- Challenging work in the field helped gather much experience, and knowledge and experience have been further improved through different training workshops during the project.

## Recommendations

We recommend a further long-term study to intensify anthrax surveillance in collaboration with human health services. Village volunteers appear to be effective in the surveillance network, and this should be incorporated into the national surveillance program in Bangladesh. In addition village volunteers could play a potential role in the development of public awareness for zoonotic diseases like anthrax.

A case-control study is essential to improve understanding of the epidemiology of anthrax in animals in Bangladesh and the links between cases of animal and human anthrax.

## Acknowledgments

The authors want to make some changes here, the new text is below. If this does not fit in even with a smaller font size then the “We would like to give special thanks” could be replaced with just “Special thanks”

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