Cross-Canada Disease Report
Rapport des maladies diagnostiquées au Canada

NORTHWEST TERRITORIES

An outbreak of anthrax *(Bacillus anthracis)* in free-roaming bison in the Northwest Territories, June–July 2006

In summer 2006, an outbreak of anthrax *(Bacillus anthracis)* occurred in free-ranging wood bison *(Bison bison athabascae)* in the eastern Slave River Lowlands (SRL) in the Northwest Territories (NWT). The SRL are located northeast of Wood Buffalo National Park and are under the jurisdiction of the Government of the Northwest Territories (GNWT). Bison habitat in the SRL includes a matrix of lowland meadows located east (population ~ 350) and west (population ~ 400) of the Slave River. There is no road access to the SRL and despite potential for agricultural development (1), there is no tame forage or livestock production in this remote part of the Northwest Territories.

Annual monitoring is done to detect anthrax in free-roaming bison in the NWT (2). A freshly dead adult bull was found during the year's initial fixed-wing aircraft survey of the SRL on June 26, 2006. In addition, 300 live bison in 5 mixed herds were also observed, as well as 7 bull-only groups, with most found within an 8-km radius of the dead bison. Field staff returned to the site by helicopter to test the carcass for anthrax and conduct more intensive surveillance. A 2nd mature bison bull was found dead in the same meadow — given its location and postmortem condition, the animal had presumably died sometime after the morning flight and within the previous 5 h. Both bison carcasses were completely intact, in lateral recumbent "saw-horse" position, and with dried bloody exudates from the nostrils. A field diagnostic test (United States Navy field ELISA tests provided by M.H. Jones, Louisiana State University, Baton Rouge, Louisiana, USA) was performed on blood swabs from each carcass; 1 tested positive for anthrax.

Based on the presumptive diagnosis and field observations, the GNWT's Anthrax Emergency Response Plan was implemented immediately. This plan includes media communications and area closures to reduce disease risk to humans, increased aerial surveillance, sampling, and diagnostic confirmation, followed by carcass treatment and disposal (2). Carcass treatment is achieved through disinfection with formaldehyde, then incineration. The principal goal of timely and complete carcass burning is to reduce environmental contamination with anthrax spores and, thereby, reduce the severity or frequency, or both, of future outbreaks.

No new carcasses were found during a subsequent surveillance flight on June 27, but an additional carcass was observed on June 29: a mature male was found recumbent and displaying terminal thrashing; it died within an hour. A field ELISA test on this carcass was positive for anthrax. Dried blood swabs collected from all 3 carcasses were sent to the Canadian Food Inspection Agency's Animal Disease Research Institute in Lethbridge, Alberta, for official confirmation based on culture; this was received on July 8, 2006.

Additional surveillance flights on July 1, combined with subsequent flights and fieldwork associated with carcass treatment and disposal, resulted in a total of 28 bison carcasses being found. The sex and age class composition of the carcasses was 14 adult bulls (50%), 5 sub-adult bulls (18%), 7 cows (25%), and 2 calves (7%). Based on the consistent stage of decomposition for the carcasses, most bison appear to have died within a few days of the first 2 cases observed on June 26, 2006. The latest death occurred on July 7, 2006, when a helicopter pilot observed a nonresponsive, moribund adult bull.

From June 26 to July 6, 18 of the most intact carcasses were treated with a 10% formaldehyde solution (22–44 L/carcass). Formaldehyde reduces the rate and extent of scavenging by black bears *(Ursus americanus)* or wolves *(Canus lupus)*, or both, for several days and also provides superficial decontamination at the carcass site, because it kills anthrax spores (3). From July 7 to 16, 2006, all bison carcasses were incinerated. To incinerate each intact carcass, we used a combination of about 440 kg of stoker's coal, 220 kg green wood, and 1400 kg of dried wood. At each site, a primary coal bed was prepared adjacent to the carcass with 12–15 (22 kg) bags of coal, along with 5–6 large green logs, arranged perpendicular to the long axis of the carcass. The carcass was rolled over onto the coal bed by using a hand winch that was tied between a stake and the 2 lowermost legs of the bison. Carcass placement on top of the primary coal bed ensured adequate airflow and sustained application of heat from below. Depending on carcass size and intactness, an additional 4–6 bags of coal were placed under the head and along the shoulders and hindquarters. Dried wood was stacked on top of the carcass, and the pyre was lit after being doused with 20 L of diesel fuel. Using this technique, we observed that the dried wood burned intensely for 2 to 3 h and initiated an even burn

of the coal bed. We found that the primary coal bed burned for up to 3 to 4 d after the pyre had been lit, after which ≥ 95% of the original carcass mass was incinerated.

Anthrax is endemic in the SRL, with 6 documented outbreaks between 1963 and 2001 killing at least 925 bison (2,4). In northern Canada, anthrax outbreaks in bison tend to occur, usually in mid-July to mid-August, after there has been a wet spring followed by hot dry weather (4). The onset of this outbreak in late June was unusually early and was likely related to an early spring with extended periods of hot weather in June. The last time an outbreak was seen as early as this in northern Canada was in 1963, when there was a biphasic outbreak — a small outbreak (n = 15) in late June, followed by a large outbreak (n = 242) in mid-July (5).

References

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