

## IBMP Briefing Statement

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**Agency:** NPS (From Aune et al. 2006)

**Issue:** Environmental Persistence of *Brucella* Organisms in Natural Environments of the Greater Yellowstone Area: A Preliminary Analysis

**Date:** October 2, 2008

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### Background:

- Fluids and tissue from brucellosis infected abortions or births contain billions of *Brucella* organisms/gram.
- The IBMP ROD recognized the need for new research to assess environmental persistence of *Brucella* shed during birth or abortion to inform adaptive management of temporal and spatial separation of bison and cattle.
- During 2001 to 2003, MFWP and APHIS took the lead to conduct field studies near West Yellowstone, MT and Corwin Springs, MT, utilizing *Brucella* strain RB51 as a surrogate for field strain *Brucella*.
- Preliminary findings were presented by Keith Aune, MFWP, at the 2006 Annual Meeting of the United States Animal Health Association. The information presented below was derived from Aune et al. (2006).

### Findings:

#### Brucella Persistence

- The average number of days that RB51 survived in tissues on top of a fetus and inside the abdomen was lower than survived beneath a fetus for all years and months.
- The maximum number of days RB51 survived was highest for fetuses set out in February and lowest for fetuses set out in mid-May.
- RB51 placed out in February through mid-May did not survive beyond June 15 for all three years and both study sites.

Month of deployment	Top	Bottom	Abdominal Swab
Feb	67	77	81
Mar	49	77	63
April	42	69	44
May	21	24	25

Table 1. Maximum days RB51 detected in fetal tissue by month and fetal location, 2001-2003.

## Fetal Disappearance

- In 2001, there was a significant difference in the mean days until fetal disappearance within Yellowstone Park (7.5 days) and those outside of Yellowstone Park (13.0 days).
- In 2002-2003, the mean number of days until fetal disappearance at 204 sites outside of YNP was ~18 days and ranged from 1-78 (S.D.=20.1). Date of fetus deployment had little effect on observed outcome. There was no difference in the medians for the months of March (13.5 days), April (13.5 days) and May (14.0 days).
- Approximately 50% of fetuses were moved at least 100 feet from the original deployment site, and the maximum was 2 miles when a fox carried a fetus out on to the ice covering Hebgen Lake to consume it.

## Brucella at Bison Birth or Abortion Sites

- Fourteen of 152 (9.2%) birth sites investigated and sampled were positive for *B. abortus* biovar-1. At nine of these fourteen sites, *Brucella* bacteria persisted 10-43 days on April sites (N=6), 7-26 days for May sites (N=3).

## **Summary Preliminary Conclusions:**

- The length of time RB51 persisted decreased from February through May, and RB51 did not persist after June 15.
- Scavenging resulted in the rapid removal of most fetuses (more quickly inside YNP than outside). Fetuses were typically scavenged within 40 days; however, some fetuses were not scavenged and naturally decomposed.
- Field strain *B. abortus* persisted in soil, vegetation, and tissue at birth or abortion sites for up to 43 days in April and 26 days in May, and mimic data from the RB51 persistence study.
- Preliminary data from these studies indicate that natural environmental conditions (UV light and temperature) lead to bacterial degradation. Animal scavenging further reduces persistence and interacts to kill *Brucella* and remove fetal tissue from the environment by June 15.

## **Literature Cited:**

Aune, K., J. Rhyan, and T. Roffe. 2006. Environmental Persistence of *Brucella* Organisms in Natural Environments of the Greater Yellowstone Area: A Preliminary Analysis. pp 205-212 In: Proceedings of the 110<sup>th</sup> Annual Meeting of the United States Animal Health Association, October 12-18, 2006, Minneapolis, MN. Available at <[www.usaha.org](http://www.usaha.org)>.

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