

ANIMAL AND HUMAN HEALTH PREVENTION OPPORTUNITIES

Unintentional *Brucellosis abortus* Strain 19 and RB51 Cattle Vaccine Exposure Among Veterinarians in Montana, Wyoming, and Idaho

Large animal veterinarians and technicians are at high risk for exposure to RB51. Veterinarians in one study reported suffering 1 needlestick injury per 1,000 injections. The live attenuated *Brucellosis abortus* strain 19 was the first cattle brucellosis vaccine used until the 1990s. This vaccine produced serum antibodies in cattle indistinguishable from a wild-type infection, and occasionally caused abortions in pregnant cattle and brucellosis in unintentionally exposed persons. The *B. abortus* strain RB51 cattle vaccine was developed from a rifampin-resistant rough mutant *B. abortus* strain and does not induce antibody response in cattle, or in persons, that can be detected by standard serologic testing. The RB51 vaccine strain is also less abortifacient than strain 19 in cattle. RB51 has been the official brucellosis vaccine for all states since 1997. Only one study in the literature could be found that assessed human exposure to RB51. The passive surveillance study described the unintentional exposure of 26 persons to RB51 in the late 1990s; exposure occurred by needlestick injury (n=21) and spray exposure (n=5); and found nineteen (73%) of the exposed persons reported at least one systemic symptom.

Wyoming, Montana, and Idaho public health departments and livestock agencies collaborated on the development of a survey instrument to assess self-reported veterinarian exposure to cattle brucellosis vaccinations in veterinarians who practice or have practiced in Wyoming, Montana, and Idaho. Adverse events following exposure to either vaccine were classified as local or systemic. Local events were defined as erythema or induration. Systemic events were defined as fever, chills, fatigue, headache, myalgia, arthralgia, diarrhea, or vomiting. The online survey was administered to veterinarians from December 2012 to March 2013. This issue of *Montana One Health* describes the results of this survey.

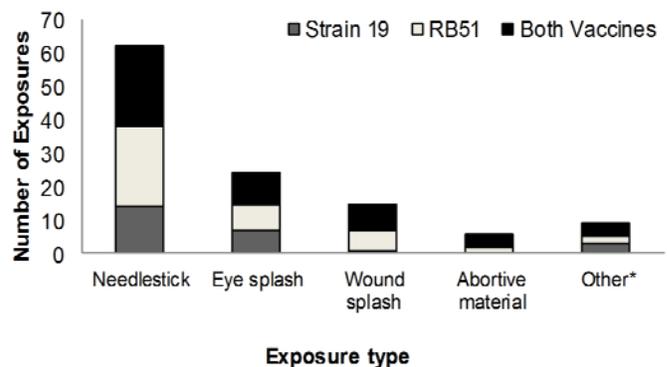
One hundred fifty-seven surveys were collected online; the results are limited to the 143 (91%) veterinary respondents who self-reported vaccinating cattle against brucellosis. The mean age of respondents was 51 years (range: 27–76 years) and 100 (70%) were male. There were 59 (41%) respondents from Idaho, 44 (31%) from Wyoming, 25 (18%) from Montana, and 15 (11%) from other states. The mean time in veterinary practice was 19 years (range: 0–48 years). Nearly 90 (62%) respondents reported administering strain 19 vaccine and 132 (93%) reported administering RB51 vaccine. The mean time of strain 19 use was 12 years (range: 0–32 years).

Gloves were worn by 58% of the respondents when reconstituting and 66% when administering RB51. Twenty percent of respondents reported using eye protection when reconstituting and administering the vaccine. Nearly three-quarters (104 [73%]) of respondents reported recapping needles after use. Respondents most commonly reported using the one-hand method to vaccinate cattle (126 [88%]), but 10 (7%) reported using the two-hand method.

Respondents reported having their veterinary staff reconstitute the vaccine 21% of the time and administer the vaccine 25% of the time. Only 12 (8%) respondents required their non-veterinarian staff to wear gloves while reconstituting the vaccine and none required eye protection.

Seventy-four (52%) veterinarians reported exposure to either strain 19 or RB51 (Figure), with 41 (55%) reporting multiple exposures to either or both vaccines.

Figure: Type of exposure by vaccine type (n=74)



*Other exposures included contact with vaccines from aerosols and oral exposure from splashes

Over 25 (35%) of the exposed respondents sought medical attention from a licensed health care provider following the exposure. The most common antibiotics prescribed were doxycycline and tetracycline. Thirty-eight (51%) respondents initiated post-exposure prophylaxis on their own. The most common antibiotics self-administered were doxycycline, oxytetracycline, and tetracycline.

Of the 74 respondents with an exposure to either or both vaccines, many of the exposures resulted in local or systemic symptoms following exposure and the majority of persons exposed had full recoveries. (Table).

Table: Local and systemic symptoms by vaccine type and exposure outcomes (n=74)

Symptom	Strain 19 n (%)	RB51 n (%)	Both n (%)
Local	33 (45)	31 (42)	-
Systemic	59 (80)	27 (37)	-
None	27 (37)	35 (47)	-
Outcome			
Full recovery	-	-	67 (91)
Chronic arthritis	1 (1)	-	-
Measureable antibodies	2 (3)	-	-
Hospitalization	-	-	2 (3)
Surgical intervention	-	1 (1)	-
Ascending infection	1 (1)	-	-

Recommendations

Veterinary medical professionals should be reminded of ways to decrease the potential for needlestick injuries and exposure to RB51 and to other pathogens. The potential for exposure to RB51 can be decreased through the use of proper personal protective equipment and safe injection practices. Wearing gloves and proper eye protection while handling and administering RB51 is important for decreasing the risk for exposure. Recapping needles and the use of two hands during injections increase risk for needlestick exposure and should be avoided.

RB51 vaccine causes both localized and systemic symptoms in exposed persons. Persons exposed to RB51 through needlesticks, eye splashes, wound splashes, or other routes should seek healthcare provider consultation as soon as possible. Health care providers should treat persons suffering high-risk exposure to RB51 with doxycycline 100 mg orally twice-daily for at least 21 days and be monitored for fever for 4 weeks following exposure and signs of systemic illness for 6 months following exposure.

RB51 Study Key Points

Human Health

- RB51 vaccine can cause both local and systemic signs and symptoms in persons exposed to the vaccine.
- Veterinarians and other animal care personnel should use proper personal protective equipment when handling RB51, including gloves and eye protection.
- Safe needle handling practices; **do not** recap needles and use the one-hand vaccination method.
- Persons exposed to RB51 should consult immediately with a health care provider.

Health Care Providers

- Patients suffering a high-risk exposure to RB51 vaccine should receive doxycycline 100 mg orally twice-daily for at least 21 days and be monitored for fever for 4 weeks following exposure and signs of systemic illness for 6 months following exposure.
- Standard serologic tests will not detect RB51 human infections.
- Health care providers should immediately report any RB51 exposure to their local health department.

References available on web version. Visit <http://www.dphhs.mt.gov/publichealth/publications.shtml>.

2,836 copies of this public document were published at an estimated cost of \$0.59 per copy, for a total cost of \$1660.54, which includes \$711.04 for printing and \$949.50 for distribution.

1400 Broadway
Helena, MT 59620-2951

Richard Opper, Director, DPHHS
Christian Mackay, Executive Officer, DOL
Jane Smilie, MPH, Administrator, PHSD
Martin Zaluski, DVM, State Veterinarian

SNAPSHOT

Vaccine Delivery

- **9 in 10** of respondents reported using the recommended one-hand vaccine method
- **7 in 10** of respondents reported recapping needles after use

Personal Protective Equipment

- **Only 3 in 5** veterinarians reported wearing gloves
- **Only 1 in 5** veterinarians reported wearing eye protection

Vaccine Exposure

- **2 in 5** veterinarians had exposure to RB51
- **1 in 2** veterinarians had multiple exposures