Overview of Research
In the USDA Infectious Bacterial Diseases Unit

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State-of-the-art:
- ABSL2 and ABSL3 small and large animal facilities
- BSL3 Agriculture large animal facility

Animal care and facilities operations expertise that supports high-containment research in all major livestock and several wildlife species
Cattle Brucellosis (*Brucella abortus*) in the United States

![Graph showing the number of cases of cattle brucellosis from 1982 to 2011. The number of cases decreased significantly from 1991 to 2011.](image-url)
Lipopolysaccharide structure of virulent and vaccine strains

**Brucella abortus** field strains

- Lipid A
- KDO
- Sugars
- O-side chain

**Brucella abortus** strain 19

- Lipid A
- KDO
- Sugars
- O-side chain

**Brucella abortus** strain RB51

- Lipid A
- KDO
- Sugars

The O-side chain is the immunodominant antigen of *Brucella* for antibody responses.
### Efficacy of RB51 as a Calfhood Vaccine for Cattle

**Protection from abortion**

<table>
<thead>
<tr>
<th>Age at Vaccination</th>
<th>Protection from abortion</th>
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<tbody>
<tr>
<td></td>
<td>% protected (# aborted/ #challenged)</td>
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<tr>
<td>10 months</td>
<td>RB51 (100% (0/20))</td>
</tr>
<tr>
<td>7 months</td>
<td>Strain 19 (100% (0/6))</td>
</tr>
<tr>
<td>5-6 months</td>
<td>Control (45% (6/11))</td>
</tr>
<tr>
<td>3 months</td>
<td>RB51 (100% (0/4))</td>
</tr>
<tr>
<td>Overall</td>
<td>Strain 19 (100% (0/19))</td>
</tr>
<tr>
<td></td>
<td>Control (54% (21/46))</td>
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</tbody>
</table>
Distribution of Feral Swine in the US

GPS mapping at http://128.192.20.53/infsms/
Brucellosis in the Greater Yellowstone Area (GYA)
Variance in Immunologic Responses between Ruminants
### “Lysine decarboxylase”

<table>
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<tbody>
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</tbody>
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VNTR Assay for Epidemiologic Tracebacks