Beneficial Approaches for Controlling Brucellosis

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Human Brucellosis
Components of a Control Program

- Surveillance
- Vaccination
- Quarantine/Removal of Infected/Risk Reduction
- Sanitation
- Trained Personnel, Records, Movement Control
- Regionalization
Surveillance

- **Sero logic testing**
  - Sales and abbatoirs (first point testing)
  - Change of ownership
  - Interstate movement

- **Periodic Herd testing**
  - i.e. Milk testing

- **Trained epidemiologist determines infected versus false positives**
The O-side chain is the immunodominant antigen of *Brucella* for antibody responses.
Vaccination

- Approved for use by species based on *Brucella* infection
- May need to be regulated due to zoonotic and abortigenic potential
- Could be used as a regulatory method to limit livestock movement
Thoughts on Brucellosis Vaccines

- Vaccination alone will not eradicate brucellosis.
- Vaccines are very good at reducing transmission and clinical disease; very poor at preventing seroconversion after exposure.
- Long-term protection related to cell-mediated immunity.
- Antibodies relatively unimportant for efficacy.
- Many vaccine strains can be pathogenic in humans or pregnant animals.
Brucellosis Vaccines Available

- **B. melitensis**: strain Rev1 (small ruminants)
- **B. suis**: none
- **B. abortus**: strains 19 or RB51, 45/20 (cattle)
- **B. canis**: none
- **B. ovis**: none
Quarantine/Removal/Risk Reduction

- Quarantine is a way to isolate infection or prevent introduction
- Removal of infected animals is used in many countries but may be cost prohibitive
- Risk Reduction – evaluate husbandry practices to identify ways to prevent transmission of brucellosis
Sanitation

- Segregate animals at parturition
- Remove and burn afterbirth/aborted fetuses to prevent fomite transmission
- Sanitize fluids/materials which may be route of transmission (i.e. milk)
Trained Personnel/Records/Animal Movement

- Use personnel with knowledge of procedures and program
- Maintain records (vaccination, testing, etc) to allow assessment at later times
- Infrastructure/Teamwork/Communication
- Brucellosis is usually spread by animal movement
- Animal Identification Essential
- Control of Testing
Containment of Infection: Control or Eradication Programs

- Identify herd of origin and exposed herds/flock
- Herd/flock or area plan
- Quarantine and/or depopulation
- Permanent marking of infected animals
- Sanitation: Cleaning and disinfection
- Herd testing until disease eliminated
- Vaccination as applicable
- Epidemiologic Investigations and follow up to detection of infection
Control of Human Brucellosis

- Addressing in domestic livestock most economical approach
  - in 1 study benefit:cost ratio of 3.2 for vaccination (Roth et al 2004)
- Pasturization of milk products
- Precautions taken to prevent direct transmission
Brucellosis control programs require a coordinated, committed regulatory framework.

Benefits include: reduced human disease, greater economic returns for livestock owner, possible improved trade opportunities.
## Comparison of Strains RB51 and 19 Vaccines in Cattle

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<thead>
<tr>
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<th><strong>Strain 19</strong></th>
<th><strong>Strain RB51</strong></th>
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<tbody>
<tr>
<td><strong>Serology on Standard</strong></td>
<td>Positive; Prolonged high titers with booster vaccination</td>
<td>Negative, even on booster vaccination</td>
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<td><strong>Brucellosis Tests</strong></td>
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<tr>
<td><strong>Clearance <em>in vivo</em></strong></td>
<td>Moderate to High</td>
<td>Low</td>
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<tr>
<td><strong>Pathogenicity</strong></td>
<td>Good</td>
<td>Similar to Strain 19</td>
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<tr>
<td><strong>Efficacy</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Zoonotic Characteristics</strong></td>
<td>Significant Human Pathogen</td>
<td>Reduced Pathogenicity as compared to strain 19</td>
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<tr>
<td><strong>Use in Pregnant Cattle</strong></td>
<td>Low Dose may cause significant abortions and high titers</td>
<td>Occasional abortions</td>
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