Sustainability and challenges of an Ecohealth Approaches for the Management of Brucellosis in Yunnan province, China

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In China the prevalence for Brucellosis in animal and human has been increasing since 2007, 1st ranked among important zoonosis.

Considered as a “re-emerging zoonoses”, it was widespread nationwide in 1950s-1970s, under control in 1990s, and re-emerging since 2000.

Notifiable disease for both animal and public health sectors.

Yunnan not listed among the 12 provinces with heaviest burden, yet considered at risk due to:

- Introduction by trade from high prevalence areas (e.g. Northern China)
- Support of dairy sector by government, increased influx from dairy cattle to Yunnan
- Concerns about specially promoted cooperative farms (small holders encouraged to join dairy cooperatives)
Characteristics for selected project sites:

**Yiliang County**
- Location: more centralized, suburb of Kunming, the capital city of province
- Economic: more developed
- Animal industry: more developed
- Human: Han dominated
- Animal species: dairy cattle and goat

**Mangshi City**
- More remote, a city bordering with Myanmar located in Dehong Prefecture
- Less developed and more traditional
- Ethnic minorities (mainly Dai)
- Buffalo and dairy buffalo
Control of zoonosis is complex and needs new approaches:

- Transdisciplinary understanding that covers various science subjects, such as animal production, animal health, public health, economics, environmental science, social science etc.
- Intersectoral research team with different backgrounds working together
- Systems thinking from different perspectives & new views to tackle the complexity of the problem
- Active participation of all relevant stakeholders and affected groups
- A consideration of equity in gender and minority issues
- A strategy to measure changes in the knowledge, attitude, and practices (KAP) of key partners via Outcome Mapping
Material and Methods (M & M)

A field survey

- Field survey (a combination of quantitative & qualitative tools):
  - Questionnaire in farmers with dairy cattle and goats at backyard, cooperative and commercial farm
  - In-depth interviews (IDI) with public health doctors, veterinarians and butchers
  - Focus group discussions (FGD) with farmers with and without ruminants respectively

Biological Sampling:

- Serum samples: from potential people at risk (farmers, doctors, veterinarians and butchers)
- Bulk milk samples: from selected farms in both areas (dairy cattle/buffalo and goat farms)
M & M  Key analysis and tests applied

- **Analysis of collected data**
  - Questionnaire: quantitative analysis
  - IDI and FGD: qualitative, semi-quantitative analysis
  - Basic statistical analysis

- **Test of samples**
  - Human sera samples: tube agglutination assay, following national standards
  - Bulk milk samples: an indirect ELISA kit for detection of antibodies against *Brucella* in bulk bovine and goats milk samples, UK
Supplemented by:

- **Literature reviews:**
  - Production performance of ruminants and development of the sector
  - Status and control of Brucellosis in animal and human

- **Retrospective investigation:**
  - Potential human cases of Brucellosis in hospitals over an one year period (July 2011 to June 2012)
  - Potential cases of Brucellosis in animals reported in veterinary stations over 23 months (Jan 2011 to Dec 2012)

- **Surveillance in outpatients in selected hospitals:**
  - Suspected cases of Brucellosis (Jul to Oct 2011)

- **Survey in human:**
  - A serological pilot screening in human in Yiliang County (Dec 2011) and in Mangshi City (Jan 2012).

**M&E via Outcome Mapping to measure KAP changes in stakeholders** (e.g. farmers and local health workers)

**Synthesis analysis of above (1), (2) and (3)**
The problem: Brucellosis in Yunnan

**Public health authorities** (hospitals and local) (IDI)
- Review of existing information
- General Z knowledge
- Specific action Brucellosis suspected patients
- Collaboration with PH

**Survey:**
- Dairy farms (milk)
- People at risk (serum)

**Farmers** (QX)
- Production data
- AH and disease prevention
- Reproductive disorders
  - Zoonoses and OH

**Villagers** (with/without livestock) (FGD)
- Animal husbandry
  - Zoonoses
  - Risk factors
  - AH services
  - PH services
  - Source of information

**Past unit, milk vendors** (FGD):
- Zoonoses knowledge
- Quality control
- Sanitation
- Inspection by authorities

**Butchers** (IDI)
- General Z knowledge
- Specific knowledge Bruc.
- Health check and status
- Hygiene and training
- Waste management

**Hospital case review:**
- Clinical cases

**Literature review**
Selected results – from lit review

**National level**

- Prevalence in ruminants increased significantly during 2003 and 2005.
- Geographic spread expanded with meanwhile 12 provinces listed as those with high prevalence's.
- Prevalence of Brucellosis in animal varied by time, region, species and production system.
- Approximately 30,000 human cases reported annually over the past 5 years and B. melitensis was the predominant species.
- Distribution of humans cases was related to gender and profession, with higher morbidity in male than female and certain risk groups.

**Provincial level**

- Yunnan Province has not been listed among 12 provinces with heaviest burden of Brucellosis, overall prevalence of 1.2% in 2011.
Suspected human cases (based on a case definition) in surveyed hospitals (2)

<table>
<thead>
<tr>
<th>County/City</th>
<th>Hospital</th>
<th>Patient</th>
<th>No of case files</th>
<th>No of cases with fever</th>
<th>No of cases with joint pain, headache and lymph node enlargement</th>
<th>No of confirmed Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fever</td>
<td>For further detection</td>
<td>Over 5 days</td>
</tr>
<tr>
<td>Yililang</td>
<td>The People's Hospital</td>
<td>Outpatient</td>
<td>41,704</td>
<td>213</td>
<td>169</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inpatient</td>
<td>3,550</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subtotal</td>
<td>45,254</td>
<td>213</td>
<td>169</td>
<td>112</td>
</tr>
<tr>
<td>Mangshi</td>
<td>The People’s Hospital</td>
<td>Outpatient</td>
<td>10,086</td>
<td>762</td>
<td>172</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inpatient</td>
<td>1,543</td>
<td>128</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subtotal</td>
<td>11,629</td>
<td>890</td>
<td>172</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>22,689</td>
<td>1,103</td>
<td>341</td>
<td>236</td>
</tr>
</tbody>
</table>
- A majority of respondents (farms, butchers) have a lower education level;
- Awareness, perception and knowledge of zoonosis are weak;
- Brucellosis not in the list of the most important diseases by all groups of respondents
- Knowledge and practice for control and self-protection of zoonoses by high risk professionals is inadequate;
- High risk practice of consuming milk and meat from sick animals & improper disposal of sick animals were observed;
- Some consumers prefer raw milk and/or meat products
- Cooperation between public health and animal health sector is weak;
- Service system in both human and animal health sectors is accessible however, more up-to-date training is needed for village-based service providers.
Results from the serological survey

Results for bulk milk

- Total 6 bulk milk samples were tested to be serologically positive (7.1%) (N=85)
- For production system, none in commercial farm, two positive milk samples in cooperative dairy cattle farm (out of 5) and four in backyard dairy cattle and goat farms
Specific results for positive tested cooperative farms (n=2)

Farm 1: Bulk milk tested +ve and also 4 human sera samples out of 5 collected (3 individual owners and 1 worker), abortion history (last 12 months) as a common problem (range 3-30 by individual farmer). One case in human met requirements as acute brucellosis infection.

Farm 2: Bulk milk tested +ve but non of the tested workers/owners (N=5), abortion history (last 12 months) with at least 1 cattle by individual farm (N=5)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Bulk milk</th>
<th>Human sera</th>
<th>Abortion history on farm</th>
<th>No of cows with abortions over last 12 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mangshi (Farm 1)</td>
<td>Dairy cattle</td>
<td>+ve</td>
<td>+ve (3 worker &amp; 1 owner)</td>
<td>Yes (4 respondents*)</td>
<td>3-30</td>
</tr>
<tr>
<td>Mangshi (Farm 2)</td>
<td>Dairy cattle</td>
<td>+ve</td>
<td>-ve</td>
<td>Yes (5 respondents)</td>
<td>1 each respondent</td>
</tr>
</tbody>
</table>
Capacity building

Project team
- Positive knowledge, attitude, and practice (KAP) changes through continued EH training, learning by doing and on-the-job training
- Exploration and use of new tools by the team previously never used. (e.g. FGD and IDI)
- Using of these tools and related analysis in other projects

Stakeholders
Changes observed through outcome journal recorded in outcome mapping meeting with vets, human doctors and village head
- Village doctors actively disseminated knowledge to their patients
- Measures for self-protection were improved
- Village doctors and veterinarians collected disease information actively
- Village heads organized activities for cleaning and hygiene
- Toilets built away from river for better sanitation & ZEID management
Overall challenges and experience

Challenges:
- 4 institutions with different priorities, different locations
- Some silo thinking... common research topic (e.g. TB, Bruc, ToxoI)
- Some language barriers
- Lack of any EcoHealth (EH) experience, same for qualitative tools

Solution:
- Local EH expert to provide technical assistance on EH
- Sufficient time to address challenges and build trust
- Team exited about new approaches/tools (e.g. FGD)

Incentives:
- Invited by FAO - Beijing to present results
“Positive collateral” effects

- Extended networking (e.g. EHRC, VPHACP, and PE, CMU, Thailand
  - MOU between YAU and CMU Vet Faculty
  - 1 graduate from YAU Vet School currently joins VPHCAP, field study in dairy cattle targeting cooperative farms planned
  - Review of applied diagnostic tests for brucellosis in animals
- “EH marriage” 2 young scientists (Dali, CDC and YAU, Kunming)