Review and update on Brucellosis
In Asia and Pacific Region

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FAO Reference Centre for Brucellosis
ANSES – Maisons-Alfort, France

The 4th FAO-APHCA/OIE/DLD
Regional Workshop on Brucellosis Diagnosis and Control
in Asia and Pacific Region
- Proficiency Test and Ways Forward for the Region
Chiang Mai, Thailand, 19-21 March, 2014
Review and update on Brucellosis

What’s new in Brucellosis?
Review and update on Brucellosis

What’s new in Brucellosis?

from the Human case notification to OIE?
## Human cases notified to OIE?

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<td>Philippines</td>
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<td>Vanuatu</td>
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<tr>
<td>Vietnam</td>
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</tbody>
</table>
What’s new in Brucellosis?
Livestock Unit (LSU) losses

- 1 camel or "other camelid" = 1.1 LSU
- 1 cattle = 0.9 LSU
- 1 buffalo = 0.9 LSU
- 1 horse or mule (equidae) = 0.8 LSU
- 1 pig = 0.25 LSU
- 1 sheep = 0.1 LSU
- 1 goat = 0.1 LSU
- 1 poultry bird = 0.016 LSU

(Chicken, duck, guinea fowl or goose)

1 LSU "dead" = 0.8 LSU lost
1 LSU "destroyed" = 1.0 LSU lost
1 LSU "slaughtered" = 0.4 LSU lost.

Brucella Abortus

Key Figures

- Countries with outbreaks: 52
- Cattle: 265,560
- Sheep and goat: 145,680
- Pigs: 35,171
- Other animals: 32,922

LSUs Lost

- Brazil: 17,485
- Iran: 14,271
- China: 12,363
- Mexico: 11,880

Most Affected Countries and Economies


Brucella Melitensis

Key Figures

- Countries with outbreaks: 29
- Cattle: 62,605
- Sheep and goat: 61,051
- Swine: 2,021
- Mule: 1,261
- Donkey: 1,261
- Other animals: 1,261

LSUs Lost

- Brazil: 4,301
- China: 2,173
- India: 2,173
- Vietnam: 1,670

Most Affected Countries and Economies

Brucella Suis

Key Figures

- Countries with outbreaks: 26
- Cattle: 114
- Sheep and goat: 81
- Pig: 76
- Mule: 41
- Donkey: 41
- Other animals: 41

LSUs Lost

- Brazil: 235
- China: 122
- India: 60
- Vietnam: 58

Most Affected Countries and Economies
- Review of the substantial literature on prioritising diseases and identify prioritisation criteria
- Current evidence on poverty and livestock, on livestock systems and their dynamics, and on zoonoses
- Systematic review of over 1,000 studies on the prevalence of the 13 priority zoonoses in people and animals
- Update the map of emerging disease events
### Mapping of poverty and likely zoonoses hotspots 2011

<table>
<thead>
<tr>
<th>Disease</th>
<th>Wildlife interface</th>
<th>Deaths human annual</th>
<th>Affected humans annual</th>
<th>Death &gt;1000 people</th>
<th>Affected &gt;1 million people</th>
<th>Animal impacts high</th>
<th>Farm intervention</th>
<th>Other (score = 1)</th>
<th>Total score</th>
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<tbody>
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<td>Gastrointestinal (zoonotic)</td>
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<td>1</td>
<td>1</td>
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<td>Leptospirosis</td>
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<td>1,700,000</td>
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<td>1</td>
<td>1</td>
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<td>554,500</td>
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<tr>
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<td>800</td>
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<td>Hanta disease</td>
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<td>Psittacosis</td>
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<td>0</td>
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<td>Japanese encephalitis</td>
<td>Possibly, bats</td>
<td>11,000</td>
<td>40,000</td>
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<td>1</td>
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<td>Buffalo pox</td>
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<td>Negligible</td>
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<td>0</td>
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<td>Rift Valley fever</td>
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<td>0</td>
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<td>1</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: high human mortality gets a double weight of as the most important criterion for many stakeholders. Total score = (human death x 2) + (humans affected) + (high livestock impacts) + (farm intervention possible) + (other concerns: severe or emerging disease). The maximum possible score is therefore 6 and the minimum 0.

* Importance of zoonotic transmission not fully known    ^ Not a problem in poor countries
Mapping of poverty and likely zoonoses hotspots 2011

Table 1.3 Predicting the number of annual cases of brucellosis based on sero-prevalence and comparing to the numbers reported to the World Animal Health Organisation

<table>
<thead>
<tr>
<th></th>
<th>Livestock prevalence %</th>
<th>Number of ruminants</th>
<th>Predicted cases a year</th>
<th>Cases reported 2010</th>
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<tbody>
<tr>
<td>East Africa</td>
<td>8.2</td>
<td>257,377,760</td>
<td>21,104,976</td>
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<td>West Africa</td>
<td>15.5</td>
<td>197,716,517</td>
<td>30,646,060</td>
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<td>South Africa</td>
<td>14.2</td>
<td>59,806,724</td>
<td>8,492,555</td>
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<tr>
<td>North Africa</td>
<td>13.8</td>
<td>57,629,367</td>
<td>7,952,853</td>
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<td>South Asia</td>
<td>16.0</td>
<td>683,181,040</td>
<td>109,308,966</td>
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<td>South East Asia</td>
<td>2.9</td>
<td>21,247,586</td>
<td>616,180</td>
<td>164</td>
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</tbody>
</table>

Our review captured information from 241 community surveys (that is, surveys from the general livestock community and not targeting high risk animals) of bovine, sheep and goat populations, representing 475,968 samples. The prevalence for different regions is shown in Table 1.2. From the number of ruminants, the prevalence of seropositive cases, and the relation between sero-positivity and disease we can predict the number of cases of brucellosis a year. The discrepancy between the number reported and the number predicted is several orders of magnitude. For example, for every 1 million cases in East Africa less than one case is reported to OIE. The situation is similar for other diseases reported to OIE. When there are 999,999 missed cases for every one report, surveillance is not fulfilling its purpose.
Mapping of poverty and likely zoonoses hotspots 2011

Table 2.1 Probable impact of intensification on priority zoonoses

<table>
<thead>
<tr>
<th>Zoonosis</th>
<th>Likely impacts of agricultural intensification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal (zoonotic)</td>
<td>Most gastro-intestinal zoonoses are food-borne and likely to increase with intensification and associated lengthening and branching of food supply chains. Many gastro-intestinal zoonoses cause little visible signs in animals reducing farmer incentives for control.</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Leptospirosis is associated with smaller farms, and pasture-grazing especially where there is stagnant water. Intensification may reduce prevalence.</td>
</tr>
<tr>
<td>Cysticercosis</td>
<td>Associated with free-range, scavenging pigs. Intensification will reduce prevalence.</td>
</tr>
<tr>
<td>Tuberculosis (zoonotic)</td>
<td>Associated with larger farms and confined systems. Intensification likely to increase.</td>
</tr>
<tr>
<td>Rabies</td>
<td>No clear link. Most human transmission from dog bites or wildlife.</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>No clear link. Transmitted by sandflies. Domestic dogs are the most important reservoir.</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>Associated with larger farms and confined systems. Intensification will increase. However, artificial insemination, often associated with intensification, will decrease.</td>
</tr>
</tbody>
</table>

- Brucellosis spread is linked to intensification (larger farms and confined systems)
- Brucellosis is more problematic in intensive systems than extensive and pasture-based systems
- Brucellosis is a brake on further livestock development
Worldwide incidence of human brucellosis 2006

Annual incidence of brucellosis per 1,000,000 population

- >500
- 50-500 cases
- 10-50
- 2-10
- <2
- Possibly endemic, no data
- Non-endemic/no data

Bovine brucellosis in the Asia-Pacific Region (OIE)

1\textsuperscript{st} sem.

2010

2011

2012

2\textsuperscript{nd} sem.

Bovine Brucellosis
(WAHID OIE 2014)
Bovine brucellosis in the Asia-Pacific Region (OIE)
Bovine brucellosis in the Asia-Pacific Region (OIE)
Some Disease Hits Fiji

Cow disease outbreak may be affecting the dairy industry. Brucellosis, a disease typically found in cattle, can also affect humans, and the outbreak has caused concerns in the country.

Brucellosis is a bacterial disease that can affect both humans and animals, particularly cattle. It is caused by the bacteria Brucella spp., which can be transmitted through contact with infected animals or their products. Brucellosis can cause fever, muscle pain, and other symptoms in humans.

In Fiji, the disease has been detected in dairy cattle, and the government is working to contain the outbreak. The authorities have imposed strict measures, including the destruction of infected animals, to prevent the spread of the disease.

Brucellosis is a concern for the Fiji dairy industry, which depends on the health of its livestock. The outbreak has also caused concerns for consumers, who may be worried about the safety of dairy products.

The government has been working with the livestock industry to contain the outbreak and prevent it from spreading. This includes strengthening surveillance and testing programs, as well as providing support to affected farmers.

The outbreak has also raised questions about the country's readiness to handle such incidents in the future. The government is working to improve its response capabilities and ensure that it is better prepared to handle similar situations.

Overall, the outbreak is a reminder of the importance of monitoring and managing livestock diseases, as well as the potential impact they can have on the health of both animals and humans.
Sheep/Goat brucellosis in the Asia-Pacific Region (OIE)

1st sem.

2010

2nd sem.

2010

2011

2012

Sheep & Goat Brucellosis
(WAHID OIE 2014)

No information
Never reported
Not reported in this period
Suspected
Infection
Clinical disease
Disease limited to one or more zones
Sheep/Goat brucellosis in the Asia-Pacific Region (OIE)
Porcine brucellosis in the Asia-Pacific Region (OIE)

1st sem.

2010

2011

2012

2nd sem.

No information
Never reported
Not reported in this period
Suspected
Infection
Clinical disease
Disease limited to one or more zones

Porcine Brucellosis
(WAHID OIE 2014)
Porcine brucellosis in the Asia-Pacific Region (OIE)
Modern international travel practices have resulted in increased exposure to a series of pathogens, including brucellosis, that are not encountered in everyday clinical practice of the developed world.

The global epidemiology of the disease, has seen the emergence of Central Asia, along with the Middle East, as the primary worldwide foci.

Due to political changes and evolution of free trade in many countries.

Open borders have resulted in a faster, often uncontrollable movement of bacteria and diseases.

Although the illegal importation of infected animals or dairy products has been acknowledged as crucial in many areas, this trend has significantly evolved in later years.

There have been persuasive data that, the disease already existed but was not recognised because of a policy of denial or even inadequate health policy in general (e.g. Albania).
The prime example is the Balkan Peninsula.

- In 1990 the disease was only present in Greece and the European part of Turkey but by 1995, after a period of political and military turmoil that led to dramatic political changes, civil wars and the formation of new countries, the disease was also recognised to be alarmingly endemic in Albania and the former Yugoslav Republic of Macedonia.
- By 2010 the disease had travelled over almost all the Balkans.
  - Bosnia-Herzegovina is facing the greatest problem, with the annual incidence of human disease rising geometrically. Cases have subsequently been imported to Croatia and the disease has been reintroduced to a brucellosis-free country, Bulgaria, in two ways – through the illegal importation of animals and animal products to the southern Muslim areas of Bulgaria from Turkey, but also through Bulgarian workers contracting the disease in farms in north-eastern Greece and returning to their homeland for treatment.
  - Thus, at present, four Balkan countries are leading the map of European endemicity for Brucella, and we are not counting in the region of Kosovo, where the burden of the disease has yet to be adequately quantified.

Importation of the disease because of illegal practices is not limited to neighbouring countries.

- Animal disease has been recognised in sheep and goats exported to Vietnam from the United Arab Emirates under a cooperative programme that would have seen the animals bred in Vietnam and their meat subsequently returned to the Emirates.
- There is ongoing emergence of animal brucellosis in the Fiji Islands, with extensive animal slaughter performed as a control measure.

The actual mode of introduction of the disease to a place one would certainly not expect to find it remains unknown, but shows how easily the disease can travel nowadays.

- Increasing recognition of the disease in sub-Saharan Africa is promising, although public health policies in these settings would be extremely difficult to implement:

Thus the global map remains practically unchanged in 2010, although hot spots are continuously added, even where least expected.

- South Korea is an example with a relatively massive increase in annual human cases and the background of this surprising epidemiological evolution cannot be adequately explained.
The prime example is the Balkan Peninsula.

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BRUCELLOSIS - GERMANY (02): ex MYANMAR, ALERT
****************************
Date: Fri 11 Jan 2013
The patient travelled with her partner from Yangon to Lake Inle, then Mandalay and Bagan. The patient remembered the consumption of milk and lassi (typical Indian dairy product) only in Mandalay. Her partner did not drink it and is not infected with brucella. Blood culture is underway with prolonged incubation.

BRUCELLOSIS - TAIWAN: 2011, IMPORTED
*****************************************
Date: Tue 7 Feb 2012
Taiwan had been free of brucellosis for 3 decades, but there were 5 imported cases last year between May and October 2011, Chou said, explaining why CDC has taken the decision to list brucellosis as a notifiable disease. The 5 confirmed cases were Taiwan nationals who had contracted the disease during overseas travel, one in North Africa, 3 in Malaysia, and the 5th in China, Chou said.

BRUCELLOSIS, CAPRINE, HUMAN - MALAYSIA: (PULAU PINANG)
**************************************************
Date: Fri 23 Jul 2010
Penang is conducting checks on goat milk suppliers and has culled 98 of the animals after a 7-year-old boy became the 1st person to be infected with brucellosis /…
The boy fell sick after drinking raw goat's milk. He was admitted to a private hospital after coming down with fever on 24 Apr 2010, said state exco member Phee Boon Poh. He was transferred to the Penang Hospital several days later after failing to respond to the antibiotics given.

Phee said that following the incident, the state Veterinary Services Department began conducting checks on milk suppliers/…
Phee said the department had so far tested 3243 serum samples of goats from 11 farms in the state. "98 of the goats were culled after the test results came in positive," he said. He said the owners of the culled goats were paid compensation of RM 5.60 [USD 1.65] per kilo.
Phee advised the public to boil milk before drinking. He also urged those selling mutton, including for the coming fasting month, to ensure the meat was free from the disease.
"An awareness campaign will be held on 27 Jul 2010 by the various government departments and the municipal councils," he said.
Bayesian estimation of true prevalence, sensitivity and specificity of indirect ELISA, Rose Bengal Test and Slow Agglutination Test for the diagnosis of brucellosis in sheep and goats in Bangladesh

A.K.M. Anisur Rahaman a, b, c,*, Claude Saegerman a, Dirk Berkvens d, David Fretin e, Md. Osman Gani a, Md. Eshhaduzzaman a, Muzahed Uddin Ahmed a, Ababir Emmanuel a

http://dx.doi.org/10.1016/j.prevetmed.2012.11.029

Abstract

The true prevalence of brucellosis and diagnostic test characteristics of three conditionally dependent serological tests were estimated using the Bayesian approach in goats and sheep populations of Bangladesh. Serum samples from a random selection of 686 goats and 1044 sheep were tested in pairs by indirect ELISA (ELISA), Rose Bengal Test (RBT) and Slow Agglutination Test (SAT). The prevalence of brucellosis in goats and sheep were estimated as 1% (95% credible interval (CI): 0.5–2.1%) and 1.2% (95% CI: 0.6–2.3%) respectively. The sensitivity of ELISA, RBT and SAT were 90.4%, 88.4% and 75.5%, respectively and the specificity were 98.6%, 98.8% and 98.7%, respectively. Interestingly, the specificity of SAT test was the lowest and the sensitivity of RBT was the highest when compared to ELISA. These results indicate a high prevalence of brucellosis in the sheep and goats population of Bangladesh which could be considered in applied research and policy making level.

Prevalence and risk factors for brucellosis in domestic yak Bos grunniens and their herders in a transhumant pastoralist system of Dolpo, Nepal

Daniel S. Jackson a, b, Daryl Y. Nydam c, Craig Attie b

Department of Population Medicine and Geospatial Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853, USA

Abstract

Objective: To determine the prevalence of brucellosis in domestic yaks (Bos grunniens) and their herders in two regions of Dolpo, Nepal.

Methods: A cross-sectional study was performed in two overlapping regions of Dolpo, Nepal. Prevalence of brucellosis was determined using the modified complement fixation test (mCFT).

Results: The prevalence of brucellosis in yaks was 16.7% (12/71) and 11.5% (1/88) in the two regions, respectively. The prevalence of brucellosis in herders was 0% (0/71) and 3.5% (3/85) in the two regions, respectively. The risk factors associated with brucellosis in yaks included age groups over 5 years old, occupation as yak herder, and region of Dolpo. The risk factors associated with brucellosis in herders included age groups over 40 years old, occupation as yak herder, and region of Dolpo.

Conclusion: Brucellosis is a significant zoonotic disease in the domestic yak population in Dolpo, Nepal. Further research is needed to determine the impact of brucellosis on the domestic yak population and the herders who depend on them.
What’s new in Brucellosis in Asia-Pacific

➢ Nothing new in surveillance/reporting!
➢ Bovine brucellosis is endemic in Central and South-East Asia and no progress observed (Exc. Fiji and South-Korea) Lao PDR? / Myanmar? / Philippines?
➢ Sheep and goat brucellosis is underestimated or under-reported or ignored
➢ Porcine brucellosis might be underestimated in the Pacific region: surveillance?
➢ Investigating human cases (exotic/ autochthonous) is essential but remains unpractised in most countries
### Human cases notified in France

<table>
<thead>
<tr>
<th>Probable origin</th>
<th>Year</th>
<th>Total 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exotic origin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iberic Peninsula</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Italy (South)</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Balkans/Turkey</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Caucasus (Armenia)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Maghreb</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Near &amp; Middle Esat</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Asia (India and/or Gulf)</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Asia (China)</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Africa (Excl. Maghreb)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>South-America (Peru, Argentina)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mexico</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>USA ?</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>French B. suis 1 endemic zone</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>Contamination en France métropolitaine</td>
<td><strong>12</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>Polynésie (B. canis)</td>
<td><strong>13</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>Laboratory-acquired brucellosis</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Wild boar or Hare France (B. suis 2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Relapse or autochtonous contamination in France (B. abortus or B. melitensis)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>No information</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19</td>
<td>24</td>
</tr>
</tbody>
</table>
Investigating human cases is essential

- Dec. 2011: one autochthonous human case in France
  - \( \Rightarrow B. \text{melitensis} \) biovar 3
- Jan-April 2012: one bovine outbreak
  - \( \Rightarrow B. \text{melitensis} \) biovar 3
- Investigations 2012-2013:
  - Domestic ruminants: no cases
  - Wildlife:
    - Hunted: 2 cases in Chamois \((Rupicapra rupicapra)\)
    - Protected Alpine ibex:
      - 29 seropositive/77 = 38 %
      - 16 culture+/34 \( \Rightarrow B. \text{melitensis} \) biovar 3
Investigating human cases is essential

- Orchitis & Arthritis
- Excretion in genital secretions + urine + milk
- Same genotype as the last bovine outbreak in 1999!!
- Source of the bovine outbreak (summer pasture)

First report of a *B. melitensis* reservoir in wildlife
What’s new in Brucellosis in Asia-Pacific

- Political changes, open borders and evolution of free trade result in a faster, often uncontrollable movement the disease
- Development of livestock and production intensification might result in easier spread of the disease
- Changes in travel practices might result in increased exposure to human populations

Brucellosis should be on the top-priorities of control and eradication programmes
Brucellosis Control /eradication strategies ….

Which tools…
Which strategy…
Preliminary considerations

The epidemiological situation is almost never homogeneous in a given country/region

**Different epidemiological / livestock contexts** within a country/region

→

**Different & adapted control / eradication strategies** to be implemented

→

**Primary goals** of a control programme:
- **Knowledge** of situation & definition of
- **Epidemiological units** of intervention
Implementing surveys to evaluate the local situation

Serological surveillance (2010):
- Blood samples were collected from:
  - adult cattle and buffaloes (> 1 year-old)
  - sheep and goats (> 6 month-old).
- Samples were submitted to NIAH and to 7 Regional Veterinary Research and Development Centres (RVRDCs) (Fig.1).
- All tests were performed according to OIE standards.
  - RBT and I-ELISA (in-house) were used for screening
  - CFT was used as a confirmatory test.

In total, 269,676 samples were collected nationwide from 13,598 herds/flocks of cattle, buffaloes and sheep & goats in 2010.

### Table 1.: Estimated prevalence of brucellosis, at herd and animal levels for beef and dairy cattle, buffaloes, and sheep & goats in Thailand in 2010.

<table>
<thead>
<tr>
<th>Region</th>
<th>Beef cattle</th>
<th>Dairy cows</th>
<th>Buffaloes</th>
<th>Sheep &amp; goats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Animals</td>
<td>Herds</td>
<td>Animals</td>
<td>Herds</td>
</tr>
<tr>
<td>1</td>
<td>7.82</td>
<td>40</td>
<td>1.09</td>
<td>5.50</td>
</tr>
<tr>
<td>2</td>
<td>1.97</td>
<td>16.25</td>
<td>0.83</td>
<td>1.72</td>
</tr>
<tr>
<td>3</td>
<td>0.72</td>
<td>6.03</td>
<td>0.14</td>
<td>1.57</td>
</tr>
<tr>
<td>4</td>
<td>0.85</td>
<td>8.09</td>
<td>0.33</td>
<td>4.16</td>
</tr>
<tr>
<td>5</td>
<td>1.72</td>
<td>11.63</td>
<td>1.23</td>
<td>6.77</td>
</tr>
<tr>
<td>6</td>
<td>1.54</td>
<td>4.94</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>7</td>
<td>5.26</td>
<td>40.35</td>
<td>0.78</td>
<td>7.7</td>
</tr>
<tr>
<td>8</td>
<td>2.05</td>
<td>1.81</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>9</td>
<td>4.99</td>
<td>2.74</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>2.4</td>
<td>5.1</td>
<td>0.6</td>
<td>4.9</td>
</tr>
</tbody>
</table>
Decision tree for brucellosis control in animals

Is brucellosis present in a certain area/country?

Yes

Are there adequate means / expertise / vet. services?

Yes

(survey/prevalence/epidemiological units)

No

Surveillance/test-and-slaughter/movement control

Mass vaccination

Combined young animal vaccination and test/slaughter

test/slaughter

No

Are there adequate means / expertise / vet. services?

No

high prevalence

Intermediate prevalence

Low prevalence
Control, surveillance & Eradication of Brucellosis…

Epidemiology is the main key…

- A sound knowledge of the situation is required before deciding of a strategy
- Adequate epidemiological parameters are required for evaluating the results and monitoring the program…
- Changes in strategy should always be based on epidemiological evidences
Control, surveillance & Eradication of Brucellosis…

Diagnosis is the 2nd key…

- Standardised tests
- Quality assurance of test performance
- Tests associations (series or parallel)
  - to increase the result predictive values
- Test result interpretation…always in relation with:
  - risk-factors
  - status of the herd, the area, the country
Don’t forget the iceberg!

Diagnostic tests

Vaccines

Political long-term will

Strategy adapted to real situation

Adequate means

Individual identification

& movement control

Control pressure – Periodic test repetition

Commitment of professionals
The 3rd FAO-APHCA/OIE Regional Workshop on Brucellosis Diagnosis and Control
with an Emphasis on B. melitensis (in collaboration with DLD)
(Sukhothai and Phitsanulok Provinces, Thailand, 21-25 November 2010)

Conclusions and Recommendations
14. That in countries where Brucellosis is observed with low to moderate prevalence and there are constraints/limitations in undertaking an appropriate control and eradication measures, the long-term vaccination is the main tool to control the disease.

15. That, where the infection is endemic, the long-term mass vaccination is the best option to be considered to control the disease.

16. That, where the disease has never been reported in member countries, an appropriate surveillance programme should be implemented to detect possible introduction of the disease and any new outbreak in the country.

19. Progress in some countries in terms of improvement of laboratory diagnostic capacity on Brucellosis such as quality assurance including standardization of testing procedures and diagnostic reagents. However, continuous efforts are still needed to be made by the member countries to utilise the knowledge and techniques acquired from the workshops to improve/strengthen their laboratory diagnosis capacity taking into consideration the epidemiological situation in animals and humans in each country.

20. That, there is a need for: (i) sharing information on epidemiological situation of Brucellosis in the region, (ii) the establishment of a regional laboratory network, and (iii) promotion of regional collaboration on the disease diagnosis and control.
Thanks for your attention…