ANIMAL HEALTH
BACTERIAL RISKS

Presenter: Dr. Beato Lenoa BVSc (Hons)
The Ministry of Agriculture: Overview

- Enhancement of food production and income security via agricultural sector growth
  - agricultural product diversification
  - private sector development
  - sustainable development in non-sugar sector
  - promote food security


- Capital programmes are implemented by the divisions addressing general and specific needs of the agricultural sector
AH&P Division of the Ministry: Overview

- Provide knowledge and related services to relevant stakeholders
- Communication link
- Advice government on the development of livestock sectoral policies and programs
- Provision of advisory services that will ensure efficient production enhancing food and income security
- Promote and facilitate jointly funded Government and private sector market focused livestock research and development programmes

Provide animal health, regulatory and technical services to maintain and improve current animal health status and prevent the introduction of exotic pests and diseases
AH&P Division of the Ministry: Overview

• National disease surveillance program

• Field investigations: MoA veterinarians will investigate any potential new animal disease outbreak/cases and also inform Biosecurity Authority of Fiji (BAF)
  - If local laboratory capacity is insufficient to obtain a definitive diagnosis, samples are sent overseas

• Border security role in conjunction with BAF
Can an infectious agent such as Brucellosis in Animals be intentionally genetically engineered to effect a mass outbreak that would cause a security threat?
**Brucella Species**

- Small (0.6 x 0.6 to 1.5µm), non-motile, coccobacillary, Gram-negative bacteria
- Aerobic, capnophillic, catalase positive
- Urease-positive
- Oxidase-positive except for *B. ovis* and *B. neotomae*
- *B. melitensis, B. abortus, B. suis* subdivided into biovars based on cultural and serological properties
- Predilection for both female and male reproductive organs in sexually mature animals
## Brucella Species

<table>
<thead>
<tr>
<th>Brucella species</th>
<th>Usual host / Clinical significance</th>
<th>Species occasionally infected / Clinical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. abortus</em></td>
<td>Cattle / Abortion, orchitis</td>
<td>Sheep, goats, pigs / Sporadic abortion</td>
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<td></td>
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<td>Horses / Bursitis</td>
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<td></td>
<td></td>
<td>Humans / Intermittent fever, systemic disease</td>
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<tr>
<td><em>B. melitensis</em></td>
<td>Goats, sheep / Abortion, orchitis, arthritis</td>
<td>Cattle / Sporadic abortion, brucellae in milk</td>
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<td></td>
<td></td>
<td>Humans / Malta fever, severe systemic disease</td>
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<tr>
<td><em>B. suis</em></td>
<td>Pigs / Abortion, orchitis, arthritis, spondylitis, infertility</td>
<td>Humans / Intermittent fever, systemic disease</td>
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<tr>
<td><em>B. ovis</em></td>
<td>Sheep / Epididymitis in rams, sporadic abortion in ewes</td>
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<tr>
<td><em>B. canis</em></td>
<td>Dogs / Abortion, epididymitis, discospondylitis, sterility in male dogs</td>
<td>Humans / Mild systemic disease</td>
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<tr>
<td><em>B. neotomae</em></td>
<td>Desert wood rat / Not isolated from domestic animals</td>
<td></td>
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<tr>
<td><em>B. ceti</em></td>
<td>Cetaceans</td>
<td>Dolphins / May cause abortion, neurological disease has been described</td>
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<tr>
<td></td>
<td></td>
<td>Humans / Little evidence of disease</td>
</tr>
<tr>
<td><em>B. pinnipedialis</em></td>
<td>Pinnipeds</td>
<td>Humans / Little evidence of disease</td>
</tr>
</tbody>
</table>

Source: Veterinary Microbiology and Microbial Disease 2011
**Brucella Species: Zoonotic Risk to Humans**

- Humans are susceptible to infection with:
  - B. abortus
  - B. suis
  - B. melitensis
  - B. canis
  - B. ceti

- Spread generally via contact with secretions or excretions
- Breaks in skin (abrasions, wounds), inhalation or ingestion
- Clinical signs in humans will present as fluctuating pyrexia (undulant fever), malaise, fatigue, muscle and joint pains
- Abortion not a feature, osteomyelitis is
- Severity-wise of infection: B. melitensis, B. suis biovars 1, 2 > B. abortus > B canis
**Brucella Species: A Fiji Context**

*B. abortus*

- Fiji was declared free from *B. abortus* in 1989 to OIE
- Achieved via S19 vaccination as well as test and slaughter strategies using RBT and CFT tests
- Impact of the re-emergence and disease control strategy: animals, farmers, various industries and economy

- Eradication efforts via the BTEC program
- 761 reactions in 2012 down to 35 reactors in 2017
- Frequent surveillance testing; infected herds or areas will have more
- Blood testing of all cattle slaughtered at the abattoir
Brucella Species: Bio-weapon

- Extensive offensive research already undertaken and field use in the past
- Category B pathogen on most lists*
- Attractive as a malicious agent in the early 20th century

- Ability to produce chronic disease
- Propensity for airborne transmission
- Multiple combined antibiotic regimens for treatment in humans
- Does not form spores, environmentally resistant
- Availability practically anywhere in the world
**Brucella Species: Bio-weapon**

Brucella, as a bioweapon of choice, fell out of favor largely due to:

- Low mortality rates compared to other pathogens
- Availability of treatment options
- Protracted inoculation period
- Emergence of new, more virulent pathogens such as anthrax, botulism etc

Iatrogenic genetic modification may affect the above
Can an infectious agent such as Brucellosis in Animals be intentionally genetically engineered to effect a mass outbreak that would cause a security threat?