“Food safety related to camelids products: Brucellosis and its impact on Public Health and the consumers as an example”

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BRUCELLOSIS

Phylum BXII: *Proteobacteria*

Class I: *Alplaproteobacteria*

Order VI: *Rhizobiales*

Family III: *Brucellaceae*

Genus I: *Brucella*

- Gram negative coccobacillus 0.5-0.7μm
- Facultative intracellular pathogen
- Non-motile
- Non spore forming
- Slow growing in enriched media at 37°C

Group Risk 3
Brucellosis is a "multi-species" infectious disease.
## Brucella: species & biovars....

<table>
<thead>
<tr>
<th>Species</th>
<th>Biovars</th>
<th>Preferred host</th>
<th>Main geographical area</th>
<th>Pathogenicity for man</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. melitensis</em></td>
<td>1, 2, 3</td>
<td>Sheep, Goats, Wild ungulates</td>
<td>Mediterranean countries, Middle-East</td>
<td>High</td>
</tr>
<tr>
<td><em>B. abortus</em></td>
<td>1, 2, 3, 4, 5, 6, 9</td>
<td>Cattle, Wild ungulates</td>
<td>Europe, America, Africa, Asia</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>B. suis</em></td>
<td>1</td>
<td>Swine</td>
<td>South America, Asia, Oceania</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Swine, Hare</td>
<td>Central &amp; Western Europe</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Swine</td>
<td>USA, China</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Reindeer</td>
<td>USA, Canada, Russia</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Wild rodents</td>
<td>Russia</td>
<td>High</td>
</tr>
<tr>
<td><em>B. neotomae</em></td>
<td></td>
<td>Desert wood rat <em>Neotoma lepida</em></td>
<td>USA</td>
<td>Not reported</td>
</tr>
<tr>
<td><em>B. ovis</em></td>
<td></td>
<td>Sheep (males)</td>
<td>Mediterranean countries</td>
<td>Not reported</td>
</tr>
<tr>
<td><em>B. canis</em></td>
<td></td>
<td>Dogs</td>
<td>America, Central Europe</td>
<td>Low</td>
</tr>
<tr>
<td><em>B. ceti</em></td>
<td></td>
<td>Cetaceans</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td><em>B. pinnipedialis</em></td>
<td></td>
<td>Pinnipeds</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td><em>B. microt</em></td>
<td>2008</td>
<td>Voles - foxes</td>
<td>Central Europe</td>
<td>Unknown</td>
</tr>
<tr>
<td><em>B. inopinata</em></td>
<td>2010</td>
<td>humans</td>
<td>USA</td>
<td>High</td>
</tr>
<tr>
<td><em>B. papionis</em></td>
<td>2014</td>
<td>baboons</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BRUCELLOSIS 2012-2013

World Animal Health Information Database (WAHID) – Version 1
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B. abortus

B. suis

B. melitensis


WWW.SENASA.GOB.AR
BRUCELLOSIS

CLINICAL SYMPTOMS

- Abortions
- Infertility
- Weak Newborns
- Placental Retention
- Orchitis Epididymitis
- Articular Lesions

WWW.SENASA.GOB.AR
BRUCELLOSIS

Elimination pathways

- Abortions
- Feces
- Urine
- Milk
- Colostrum
- Semen
- Vaginal fluids

www.senasa.gob.ar
Abortion is the main sign of brucellosis…
But, **most infected females give birth normally**…

- **In both cases, huge and durable excretion** of Brucella

(Cattle) one abortion/normal infected birth sheds $10^9$-$10^{13}$ Brucellas

1.460 organisms infect 22% herd
146.000 organisms infect 55% herd
146.000.000 organisms infect 90-100% herd

(intraconjunctival strain *B. abortus* 544)
MANTHEI 1951

Explains the **rapid multiplication of cases** and outbreaks

Explains the **easy transmission** to humans
Environmental Contamination

Transmission pathways

BRUCELLOSIS

Wild Ruminants, Rodents, Carnivores

Suids

Artificial insemination

Venereal

Fetuses

Secretions

Vertical transmission

Congenital

Environmental Contamination

Aerosols

Food

Direct contact

Water

Manure

Grass

Tools

Footwear

B. abortus

B. melitensis

B. suis
**Survival in the environment**

**BRUCELLOSIS**

<table>
<thead>
<tr>
<th>Material</th>
<th>Survival Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water (lakes) 37°C and pH 7.5</td>
<td>-1 day</td>
</tr>
<tr>
<td>Water (lakes) 8°C and pH 6.5</td>
<td>+ 57 days</td>
</tr>
<tr>
<td>Fluids, secretions in summer</td>
<td>10 - 30 min</td>
</tr>
<tr>
<td>Milk at room temperature</td>
<td>2 - 4 days</td>
</tr>
<tr>
<td>Fetuses kept in the shade</td>
<td>6 - 8 months</td>
</tr>
<tr>
<td>Leather</td>
<td>15 days</td>
</tr>
<tr>
<td>Dried soil at room temperature</td>
<td>4 days</td>
</tr>
<tr>
<td>Wet soil at room temperature</td>
<td>66 days</td>
</tr>
<tr>
<td>Bovine urine at room temperature</td>
<td>4 - 30 days</td>
</tr>
<tr>
<td>Bovine feces</td>
<td>100-200 days(0°C)</td>
</tr>
</tbody>
</table>

*Brucella survive on/in many materials*

Brucelosis ovina y caprina, Crespo Leon, Spain
BRUCELLOSIS

INGESTION

VENEREAL

SKIN and CONJUNCTIVE

INHALATION

ACCIDENTAL INOCULATION

Entry Doors
Occupational disease
BRUCELLOSIS

- Rural workers
- Veterinarians, vaccinators
- Operators of slaughterhouses
- Microbiologists and Laboratory Technicians
- Employees tanneries
- Dog Kennels
- Livestock carriers, etc
Is it possible?
It may occur outside endemic areas. Occurring outbreaks involving adults and children. Frequent in tourists.
Camel meat and milk are the **key foods** in arid and semi-arid areas of the African and Asian countries

Increase demand for camel products

most of camel milk is consumed in the **raw state** without any heat treatments

informal milk market / Unhygienic milk handling practices

Increase of camel movements and trade

Change in camel production systems

Insufficient information exchange

Lack of knowledge/education infectious disease

PUBLIC HEALTH RISKS

BRUCELLOSIS
**Clinical symptoms**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthenia</td>
<td>60 %</td>
</tr>
<tr>
<td>Fever</td>
<td>70 %</td>
</tr>
<tr>
<td>Myalgia</td>
<td>65 %</td>
</tr>
<tr>
<td>Sweating</td>
<td>61 %</td>
</tr>
<tr>
<td>Joint and lumbar pain</td>
<td>55 %</td>
</tr>
<tr>
<td>Headache</td>
<td>41 %</td>
</tr>
<tr>
<td>Anorexy</td>
<td>16 %</td>
</tr>
<tr>
<td>Weight loss</td>
<td>44 %</td>
</tr>
</tbody>
</table>

**Clinical Signs**

<table>
<thead>
<tr>
<th>Sign</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphadenitis</td>
<td>22 %</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>22 %</td>
</tr>
<tr>
<td>Orchiepididymitis</td>
<td>3 %</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>26 %</td>
</tr>
<tr>
<td>Focalization OA</td>
<td>20-50 %</td>
</tr>
<tr>
<td>Arthritis</td>
<td>21 %</td>
</tr>
<tr>
<td>Sacroespondilitis</td>
<td></td>
</tr>
<tr>
<td>Compromise SNC</td>
<td>&lt; 1 %</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>&lt; 1 %</td>
</tr>
</tbody>
</table>

**In Humans**

**BRUCELLOSIS**

**Clinical Signs**

- Lymphadenitis 22 %
- Splenomegaly 22 %
- Orchiepididymitis 3 %
- Hepatomegaly 26 %
- Focalization OA 20-50 %
- Arthritis 21 %
- Sacroespondilitis
- Compromise SNC < 1 %
- Endocarditis < 1 %

**Treatment**

- Doxiciclina 200 mg / day V.O. 42 days
- + Estreptomicina 1g /day I.M. 21 days
- Doxiciclina 200 mg / day V.O. 42 days
- + Rifampicina 900 mg / day V.O. 42 days

*Dr Wallach J.C, Hospital Muñiz, Bs. As, Argentina*
Human Brucellosis: world distribution
BRUCELLOSIS

VACCINATION

DIAGNOSIS

SLAUGHTERHOUSE

EPIDEMIOLOGY

EDUCATION

WWW.SENASA.GOB.AR
BRUCELLOSIS

- Zoonosis
- “Neglected” Disease
- Underestimated
- Underdiagnosed
- One world, one health
Thank you !!!!!

anicola@senasa.gov.ar