SOME SPECIFIC CONSIDERATIONS FOR THE BRUCELLOSIS CONTROL IN SOUTH EAST EUROPE

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BREAKDOWN OF THE POLITICAL SYSTEM IN THE 1990'S

- Governmental property transferred to private property.
- Breakdown of large governmental farms.
- Increased number of small private holdings
  (although there were some private holdings during the former system)
**POLITICAL CHANGES IN THE 1990’S HAVE CAUSED CHANGES IN THE STRUCTURE OF THE NATIONAL FLOCK**

Although different population trends have been observed in most countries, vast majority of sheep and goats are kept extensively!

- Shepherded-extensive
- Common pastures / Contacts between flocks
- Migration


Farming of sheep & goats for Bulgaria: Source: http://www.fao.org/regional/europe/PL0/RTS50/008.htm
POLITICAL CHANGES IN THE 1990’S AND THE MANAGEMENT OF THE VETERINARY SERVICES

- Strong orientation towards the test and slaughter strategy

- Omit independent audits at any level (laboratory, veterinary services, veterinary practices)

- If you can’t eradicate, don’t report it!


Source 2: Republic Department for Human Health Protection of RM
CURRENT STATUS

- Strong orientation towards EU integrations (for non-member states).
- Reinforcement of intraregional collaboration.
- Strong support by different EU programs.
  - Legislation
  - Organization
  - Access to EU funds (FP6, FP7)
  - Direct involvement together with competent authorities
- Strong involvement of national / international organizations (FAO, World Bank, USAID…)
- Improvement in technical and organizational capacities for infectious diseases of animals, including Brucellosis.

CONTROL AND/OR ERADICATION
(WHAT ARE THE SPECIFIC CONSIDERATIONS)

Competent Veterinary Authority
(appropriate strategy & service)

... PLUS PUBLIC AWARENESS ...

Appropriate diagnostic strategy
(not only methods)

Sampling strategy
(veterinary practitioners)

Dynamic & sustainable measures!
### STRATEGY SELECTION FOR CONTROL OF BRUCELLOSIS
**CAPACITIES VS. BUDGET**

**IS BRUCELLOSIS PRESENT?**

<table>
<thead>
<tr>
<th>Level of Prevalence</th>
<th>Strategy</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>High prevalence</td>
<td>Elimination of infected animals</td>
<td>Minimizes vaccine induced abortions</td>
<td>- Risk of epidemics and subsequent human infection</td>
</tr>
<tr>
<td>Intermediate prevalence</td>
<td>Vaccination of young animals and test and slaughter of older infected animals</td>
<td>- Herd immunity slowly established (unless moving from mass vaccination strategy)</td>
<td>- Higher cost</td>
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<td>Low prevalence</td>
<td>Surveillance and movement control</td>
<td>- Serological tests to differentiate infected and vaccinated animals are not optimal and cannot be relied upon for accurate diagnosis of an individual animal</td>
<td>- Need efficient veterinary services (animal identification, laboratory support, movement control)</td>
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**STRATEGY SELECTION FOR CONTROL OF BRUCELLOSIS (ADVANTAGES & DISADVANTAGES)**

<table>
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<tr>
<th>STRATEGY</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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</table>
| Mass vaccination | - Reduces zoonotic impact  
- Herd immunity quickly established  
- Effective disease control and reduction in losses due to disease  
- Well accepted by owners  
- Easy to manage and economical  
- Flock immunity can be maintained by vaccinating young animals. | - Vaccine induced abortions in pregnant animals  
- Distinguishing infected from vaccinated animals is not feasible in the short term  
- Infected animals remain on farms for some time. |
| Vaccination of young animals and test and slaughter of older infected animals | - Minimizes vaccine induced abortions  
- Serological response reduced in vaccinated non-infected animals allowing test to differentiate infected and vaccinated animals | - Herd immunity slowly established (unless moving from mass vaccination strategy)  
- Serological tests to differentiate infected and vaccinated animals are not optimal and cannot be relied upon for accurate diagnosis of an individual animal |
| No vaccination Test and slaughter | - If successful will result in elimination of the infection in the region.  
- Diagnostic tests are more accurate in non-vaccinated animals but still not optimum. | - Risk of epidemics and subsequent human infection  
- Higher cost  
- Need efficient veterinary services (animal identification, laboratory support, movement control)  
- Suitable for low disease prevalence areas only  
- Removal of protective cover of vaccination may allow disease prevalence to increase  
- May require whole herd slaughter to be effective |

Whichever strategy applied, it should be
well planned, compact and sustainable!

Changes should be duly justified!

...However a recent increase in the number of outbreaks, especially in sheep (9 outbreaks in 2003, 17 outbreaks in 2004 and 77 outbreaks in first half of 2005), has indicated the need for modification of the current approach to control of the disease...

STRATEGY SELECTION FOR CONTROL OF BRUCELLOSIS

Ceasing vaccination may lead to significant spread of the infection among sheep & goat population and increased incidence of human brucellosis

Sources:


HUMAN HEALTH CONSIDERATIONS DURING VACCINATION

LABORATORY CRITERIA

Presumptive diagnosis
- RBT (positive tests to be confirmed by one of the “Confirmatory diagnosis” tests);
- SAT

Confirmatory diagnosis
- Isolation from blood or other clinical specimen;
- A presumptive lab. diagnosis (RBT, SAT) combined with non-agglutinating antibody test (ELISA IgG test, Coombs IgG);
- PCR and new rapid tests such as the lateral flow assay are yet to be accredited.

CASE CLASSIFICATION

Suspected:
- Case compatible with the clinical description
- Epidemiologically linked to suspected/confirmed animal cases or contaminated animal products.

Probable:
- Suspected case with presumptive laboratory diagnosis.

Confirmed:
- Suspected or probable case with confirmatory laboratory diagnosis.

Source:
WHO Definition of brucellosis in humans: http://www.who.int/zoonoses/diseases/Brucellosis/surveillance.pdf; Accessed on 01.02.2011
CONTROL AND / ERADICATION
(WHAT ARE THE CONSIDERATIONS?)

DEFINITION OF “OBSERVATION UNIT”

OIE Terrestrial Animal Health Code
Chapter 14.1.: Caprine and ovine brucellosis (excluding Brucella ovis)

Chapter 11.3.: Bovine brucellosis
(Source: http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.11.3.htm; Accessed 31, January 2011)

-Country or zone officially free from brucellosis
-Herd / flock officially free from bovine brucellosis

COUNCIL DIRECTIVE of 28 January 1991 on animal health conditions governing intra-
Community trade in ovine and caprine animals (91/68/EEC)

....
For a region which is not officially brucellosis-free where more than 99 % of the ovine or caprine holdings


CONTROL AND / ERADICATION
(WHAT ARE THE CONSIDERATIONS?)

DEFINITION OF “OBSERVATION UNIT”

-Definition of Holding, Herd, Flock, Region, Zone ?
-Definition of a Country (in terms of animal movement) ?
-Reports on between country movement and spreading of Brucellosis in other countries!

-Definition of Holding, Herd, Flock, Region, Zone ?
-Fragmentation of the national flocks (large number of small holdings).
-Cumulating animals from one or more villages for common pasture.
-Migration between administrative units within a country
- (Municipalities, Regions, Cantons ...)
-Winter summer grazing

-Traditional pastures around the borders of two or three countries (Especially former YU territory)

STRATEGY SELECTION FOR CONTROL OF BRUCELLOSIS
VACCINATION (Red); TEST & SLAUGHTER (Green); NO DATA (Yellow)

- Animal movements (often around the blue cycle) from red to green countries may cause confusion in interpretation of the test result?

IDENTIFICATION AND REGISTRATION SYSTEMS FOR ANIMALS

- Identification of cattle applied in most of the countries in the region.

- What is the progress of identification of sheep and goats?
  - Electronic identification of sheep and goats ??? *

- Linking identification to an electronic database *
  - Integration of GIS
  - Improved movement control
  - Testing
  - Real time monitoring of implemented measures
  - Epidemiological investigations

- Would a regional “real time” disease information exchange platform, be applicable and useful?
  - Predefined reports on an Internet platform.
  - Limited access to up-to-date informations.
  - Possible direct on-line communication.

**DIAGNOSTIC PROCEDURES**

- Most of the laboratories have technical capacity of performing diagnostic methods.

- What is the status of accreditation under ISO 17025?

- What is the status of standardization of diagnostic methods?
  - Lot of laboratories performing tests without using the OIE standard sera!

- What is the status of between laboratory harmonization of diagnostic methods?
  - Sample which is positive in your lab, should not be negative in my lab!

- Careful examination of the annual proficiency test results?
  - How good is my lab performing?
  - Compare with other labs!
  - Apply corrective measures!

- Bank of local, well defined standard sera?

- **ANSWER THE QUESTION:**
  HOW DOES MY TEST WORKING?

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OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2010: Chapter 2.4.3.: Bovine Brucellosis;

...Interpretation of the results: Sera giving a titer equivalent to 20 ICFTU/ml or more are considered to be positive...


COUNCIL DIRECTIVE of 28 January 1991 on animal health conditions governing intra-Community trade in ovine and caprine animals (91/68/EEC)

...Serum containing 20 or more ICFT units/ml must be regarded as positive in the complement-fixation test ...


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**20 ICFU/ml ?**

Influence on the final status of the sample on PPV and NPV?
### Diagnostic Procedures

*Standardization / harmonization of other testing methods*

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### Diagnostic Procedures

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DIAGNOSTIC PROCEDURES

- Deviation of 5 ICFU will not affect the interpretation of clearly positive and clearly negative samples, but will significantly affect cut-off samples!
- This affects the sensitivity or specificity of the test!

PPV and NPV at different disease prevalence!

Altering the characteristics of the test in the same epidemiological environments

9% decreased sensitivity and 4% decreased specificity (test B compared to test A), reduces the PPV for over 30% at low disease prevalence!
**DIAGNOSTIC STRATEGY**

- To be determined by the competent authority together with the laboratory!
- Different tests will work differently at different disease prevalence!
- Parallel v.s. serial testing?
  - Parallel testing increases sensitivity (declaration of free status).
- Testing during vaccinal strategy
  - Determine the serological response after vaccination (% seroconverted & duration of detectable antibodies).
  - Test late after Rev 1 vaccination.
  - Check the success of vaccination.
  - Isolation.
  - Differentiation of field strain from Rev 1 (Isolation, RFL Polymorphism, PCR, Sequencing…).
- Adjust the implementation of the strategy to individual conditions in the country.

**RECENT PROJECTS IN THE REGION**

- 2008: CARDS Twining Project in Bosnia and Herzegovina, Legislation on Brucellosis
- 2009: META Net International Conference: Brucellosis in Mediterranean Region (3 thematic issues in 2 Medline cited journals issued)
- 2009: FAO Workshop on Control and Vaccination Strategy in Bosnia & Hercegovina
- 2009: FAO Technical Meeting in Collaboration with WHO and OIE: Brucellosis in Euroasia and Middle East
- 2010: EU Project: Protection against Zoonotic Diseases in Albania
- 2010: World Bank Project: Business Plan for the Veterinary Laboratory in Podgorica (Mainly Brucellosis)
- ???: SIDA (Sweden): Support in implementation of Vaccination of Sheep & Goats in Bosnia & Herzegovina
UPCOMING TC PROJECT AT THE JOINT FAO / IAEA DIVISION IN BOSNIA AND HERZEGOVINA

“Improved surveillance and control of transboundary diseases, using Brucellosis as a model in Bosnia and Herzegovina”

1. Upgrade of laboratories and laboratory capacities.
   - Standardize diagnostic methods (Cut-offs for RBT, CFT, iELISA, cELISA ), (according to OIE International standards OIESS / OIEELISA sp, wp, n).
   - Production of national standard sera.
   - Implement molecular tools for discrimination of Br. melitensis field strain from Rev 1 strain
   - Between laboratory harmonization.
   - Simultaneous implementation/improvement of QC / QA principles of ISO 17025 for the methods of interest.

2. Check up post-vaccinal antibodies (titer and duration) in well controlled, randomly selected flocks.
   - Determine the proportion of sero-converted lambs after controlled vaccination.
   - Determine the duration of detectable antibodies.

3. Implementation of continuous checkup of the success of vaccination.
   - Select samples from each geographical unit, under responsibility of a single veterinary practice.
   - Determine the proportion of sero-converted animals after vaccination.
   - Where appropriate apply corrective measures.

4. Establishment of an Epidemiological Unit at the Head Veterinary Offices
   - Epidemiological support during surveillance of Brucellosis during vaccination.
   - Epidemiological support during surveillance of Brucellosis in transitional period (vaccination to test-and slaughter strategy).
   - Development and implementation of a strategically designed surveillance plans fro other diseases.

THANK YOU!