

**Short-term Mission on
“Outbreak procedure - Rabies”
- Animal Health -**

**within the Twinning Project BA05 IB AG 01
Sarajevo, 12th to 15th of February 2007**

1. Name and Function of the Experts

Dr. Thomas Müller, FLI (Friedrich-Loeffler-Institute), Wusterhausen

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2. Objectives and Tasks of the Mission

The objective of the mission was an analysis of the veterinary sector in BiH concerning animal health and the evaluation of the present organisation in animal health control implementation, especially rabies control.

An assessment of the structure of the SVO and of the Competent Authorities concerning the reporting system and outbreak management is carried out.

This analysis is based on the introduction and presentations given by representatives of the SVO and the CA's and on discussions with participants. No field investigations were made.

The report provides a survey about the organisation of the animal health system in BiH concerning rabies control.

3. List of Acronyms

BiH	= Bosnia and Herzegovina
CA's	= Competent Authorities
DB	= District of Brčko
EVS	= Entity Veterinary Services
FBiH	= Federation of Bosnia and Herzegovina
KM	= Convertible Marks
MoAFWM	= Ministry of Agriculture, Forestry and Water Management of RS
MoAWMF	= Ministry of Agriculture, Water Management and Forestry of FBiH
MoFTEA	= Ministry of Foreign Trade and Economic Affairs
RS	= Republic of Srpska
SVO	= State Veterinary Office

4. Meetings and Identification

- 12th February 2007: Meeting at the State Veterinary Office (SVO) in Sarajevo (Twinning Bureau)
Persons visited:
DVM Slaviša Kreštalica, Secretary, SVO
Dr. Darko Čobanov, SVO
Dr. Karoline Schollmeyer, RTA
DVM Edin Lendo, Assistant to RTA

- 13th February 2007 (Diekmann, Fritzemeier and Müller):
Meeting at the Veterinary Station Tuzla, Tuzla Canton
Persons visited:
Prof. Dr. Sci. Jasmin Ferizbegovic- head of veterinary station Tuzla

- 13th February 2007 (Diekmann, Fritzemeier and Müller):
Meeting at the Veterinary Inspection Tuzla, Canton Tuzla
Persons visited:
Dr. Durakovic Besim- head of inspectorate Tuzla canton
Dr. Celikovic Mersudin- Head inspector
Dr. Isovica Faruk- veterinary inspector
Dr. Mehanovic Lejla- veterinary inspector
Dr. Junuzovic-Isovica Suada

- 14th February 2007 (Diekmann and Fritzemeier):
Meeting at the Veterinary Station Bosanska Krupa, Una-Sana Canton
Persons visited:
Dr. Munir Veladzic - Trade Sector-Municipality Bosanska Krupa
Enes Mustedanagic - head of veterinary station Bosanska Krupa
Adis Dzafic - intern veterinarian in veterinary Bosanska Krupa
Aladin Sabljakic - Cantonal veterinary inspector

- 14th February 2007 (Müller):
Meeting at the Virological Institute of the Veterinary Faculty of Veterinary Medicine,
National Reference Laboratories
Persons visited:
Dr. Ramiz Velic-Head national reference laboratory for rabies
Dr. Karoline Schollmeyer, RTA

- 15th February 2007:
Final meeting on future steps to be taken in rabies control in BiH at State Veterinary
Office, Sarajevo
Persons visited:
DVM Slaviša Kreštalica, Secretary, SVO
Dr. Darko Čobanov, SVO
Dr. Karoline Schollmeyer, RTA
DVM Edin Lendo, Assistant to RTA

5. Description of activities during visit:

- to gather information on the legislation on animal disease control and animal protection in BiH, with special emphasis on rabies control,
- to gather information on the rabies situation in BiH,
- to evaluate the rabies surveillance and reporting system,
- to get information on currently implemented rabies control strategies,
- to gain information on the population numbers and densities of foxes as well as owned and stray dogs,
- management of stray dogs, management and organisation of rabies vaccination of owned dogs in the BiH entities,
- final discussion on future steps to be taken in rabies control in BiH.

6. Results

Legislation on animal disease control, e.g. rabies control, and animal protection and welfare:

- The veterinary services of the entities and the district Brcko are responsible for the surveillance and control of rabies in animals in BiH, whereas the public health division in the entities is responsible for the prevention of rabies in human beings.
- The basic principles for animal disease control and animal welfare in Bosnia and Herzegovina are laid down in the Law on Veterinary Medicine in Bosnia and Herzegovina („Official Gazette of BiH“, number 34/02). Based on this law the SVO has passed the “Decision on measures of control of infectious and parasite diseases of animals and their implementation and financing in the year 2007”, which also addresses rabies.
- Furthermore, there exists a rule book dating from 1988 in which general guidelines concerning the detection of animal disease outbreaks and the measure to be taken are laid down. This rule book is considered a secondary legislation for animal disease control in BiH. However, a specific legislation on rabies control as in other European countries does not exist.
- According to the old OIE classification of infectious diseases all list A diseases and certain list B diseases are notifiable. Hence, in line with international standards rabies in BiH is a notifiable disease.

Submission of suspect animals and reporting of rabies cases

- In general, rabies suspect animals – both, wildlife and domestic animals – are reported by the public first to cantonal or municipal veterinary stations, which subsequently organise the transport of animal carcasses to a regional veterinary laboratory. The regional veterinary laboratory in turn submits those animals for rabies diagnosis to the responsible veterinary laboratories for rabies diagnosis of the Republic of Srpska and the Federation. The submission procedure takes about a day. The veterinary stations in the municipalities of the Federation have to pay investigations fees for rabies diagnosis.
- Positive results obtained in the veterinary laboratory for rabies diagnosis are reported to regional veterinary laboratory which in turn informs the Ministries of Agriculture of the Kantons or municipalities from which the animal was submitted from. The response from laboratories usually takes about a day after submission of the sample. The kantonal Ministries of Agriculture or the veterinary administrations of the municipalities in turn inform the respective veterinary station in the municipality and the veterinary inspectorate of the Kanton. The veterinary inspectorates officially confirm a rabies outbreak and inform the veterinary services and the veterinary

inspectorate of the entity. If after three month no further rabies case is notified the measures are lifted.

- If positive results are related to human exposures, the public health service of the municipality is also informed. Negative results are only kept at a local level.
- Exchange of information on animal diseases, e.g. rabies between veterinarians is established at a kantonal level based on the monthly animal disease reports. Exchange of information between veterinarians of other municipalities and Kantons has improved since the establishment of a veterinary chamber.
- There is no computerised reporting system and no national rabies data base for rabies available today.

Rabies surveillance

- In BiH there is no appropriate rabies surveillance system implemented meeting international standards (sample size and target animals). In general, rabies surveillance in BiH is insufficient and considerably biased at a regional level.
- There is insufficient information at the respective veterinary administrative levels on the number of animals submitted for testing. So far, only positive rabies cases are recorded. On a monthly basis, rabies cases from municipalities are collated by the veterinary inspectorates of the Kantons. Rabies data are subsequently compiled and forwarded as part of disease reports both to the Ministries for Agriculture of the Kantons and the Veterinary Inspectorate of the entities on a quarterly and monthly basis, respectively.
- At a federal level veterinary bulletins are issued on a monthly basis containing information on the occurrence and number of animal diseases outbreaks, e.g. rabies in the respective entities of BiH. Those bulletins are issued and delivered by the Veterinary Inspectorate of the entities to all veterinary services.
- Nevertheless, at a national level rabies data is not completely available at SVO.
- Recently, the Veterinary Inspectorate of the Kanton of Tuzla initiated also the collation of the number of animals tested for rabies.
- Although there are contacts to and collaboration with hunters at a local level, there is currently no access to hunting statistics.

Rabies diagnosis

- In BiH, there are eight regional veterinary institutes of which two are responsible for rabies diagnosis. One responsible veterinary laboratory for rabies diagnosis each is located in the Republic of Srpska and the Federation in Banja Luka and Sarajevo, respectively.
- According to the Decision on establishing of reference laboratories in BiH ('OJ B&H', No. 68/05 and last amended 90/05) the virological laboratory of the Veterinary Faculty of Veterinary Medicine serves as a national reference laboratory for rabies in BiH.
- In principle, rabies diagnosis is conducted according to OIE and WHO standards, however there are still differences in the methods established in the two laboratories. In the veterinary institute in Sarajevo, the fluorescent antibody test (FAT) and the mouse inoculation test (MIT) are standard techniques. Also, the rabies tissue culture infection test (RTCIT) and the reverse transcription polymerase chain reaction (RT-PCR) are available as confirmatory tests but are not routinely used. In contrast, in the veterinary institute in Banja Luka the FAT is used as a gold standard. The RTCIT, the MIT and the RT-PCR has not been established yet as confirmatory tests, although the heads of the laboratories have been trained at the WHO Collaborating Centre for Rabies surveillance and Research at the FLI, Germany.
- At the moment there is no official possibility to exchange rabies data and even samples between the two laboratories. The veterinary institute in Banja Luka sends

samples with a suspect FAT results or with negative FAT results but evidence of human exposure to the institute in Novi Sad, Serbia.

- Also, ring trials have not been established yet.
- Currently, no routine characterisation of rabies virus isolates circulating in BiH using either monoclonal antibodies nor sequence analysis is conducted. In the past, a few rabies virus isolates had been typed and sequenced by the WHO Collaborating Centre for Rabies surveillance and Research at the FLI, Germany.
- Whereas testing of samples for rabies is free of charge in the Republic of Srpska, in the federation the fee for one test is 50,- KM. The veterinary station submitting the sample is charged.
- Both laboratories but especially the one in Sarajevo are facing financial problems which result in difficulties to purchase diagnostic reagents, biologicals, test kits and reference standards for rabies diagnosis.
- Both laboratories have established good contacts with their counterparts in neighbouring countries. However, there are no contacts between the two laboratories and the SVO established yet.
- There exist full epidemiological data on rabies at the reference laboratories responsible for each entity based on the samples submitted for the past 10 years at least. Also, the head of the reference laboratory for rabies at the veterinary institute in Sarajevo has conducted an excellent epidemiological analysis on rabies for the Federation.
- There are attempts to start establishing a quality management system.

Currently implemented disease combat strategies:

- In BiH no national rabies control or eradication program is implemented so far.
- According to the “rule book”, if a rabies case has been diagnosed and officially confirmed measure to be taken are as follows:
 - disinfection of the “infected area”,
 - tracing back of contacts of the rabid animal with pets and human beings,
 - the vaccination status of pets having had possible contacts to the rabid animals is to be checked,
 - if non-vaccinated pets are identified they have to be monitored for 15 days at the yard,
 - dogs and cats in a certain (undefined) area are to be vaccinated,
 - there is a possibility of culling of non-vaccinated pets.

The veterinary inspectorates of the Kantons or districts have to supervise the measures to be taken.

- Rabies control in BiH is mainly focussed on disinfection measures and vaccination of owned dogs, cats and other domestic animals. Whereas in former times vaccination of animals was obligatory, nowadays vaccination of animals is on a voluntary basis.
- The number of doses is calculated (i) on the estimation of the dog density on a provincial level and (ii) on the current rabies situation.
- According to information provided all dogs in BiH have to be registered. Data on the number of registered dogs and the estimated census of dogs in the municipalities is not available as a dog register is missing.
- A further big problem is the high number of stray dogs in BiH which are considered to be the main vector for transmission of rabies to humans. Estimations on the number of stray dogs are not available.
- The vaccination of dogs is conducted using commercially available inactivated rabies virus vaccines which are imported. BiH does not produce rabies virus vaccines itself. The vaccination of animals is not free of charge. Owners have to pay for the vaccine and the application. Vaccination can be done by both private and governmental veterinarians. There are neither press releases nor TV or radio announcements.

- The veterinary inspectorates are responsible for collating data on the number of vaccinated animals within the municipalities. Based on existing data, in general, the vaccination coverage in dogs and cats throughout BiH can be considered low.
- In Tuzla and Brcko, for example attempts were successful to provide a vaccination of dogs and cats free of charge. In agreement with the mayor the municipality covers the costs for vaccination; the costs accounting for about 30000,- Euro per year. Vaccination campaigns are announced several weeks before and conducted as a door-to-door campaign. This approach resulted in a 10 fold increase in the number of vaccinated pets during the past three years.
- The vaccination of hunting dogs and other service dogs is obligatory.
- There are attempts to reduce the number of stray dogs by culling (hunting) but this approach is generally not accepted by the public. A Dutch animal protection association is engaged in BiH trying to solve the problem of stray dogs by building animal shelters and conducting ABC programs in certain regions.

Human rabies prevention

- Information on the number of human rabies cases in BiH were not inquired as this did not belong to the terms of reference for this mission. Nevertheless, data on human rabies cases and the number of post-exposure prophylaxis (PEP) in humans applied per year should be available at the public health services of the entities.
- It is to be assumed that PEP is available for any person in BiH bitten by or exposed to a rabid animal or to an animal suspicious of being rabid and that PEP meets international standards.
- In general, contacts between veterinary and public health services seem happen to occur only at a local level if a rabies case is confirmed and human exposure to an rabies suspect animal is to check.
- In general, there are no regular meetings on rabies between veterinary and public health services at different administrative levels throughout BiH. Also, a frequent exchange of information on rabies and the number of vaccinated dogs between veterinary and public health services is not established yet.

7. Problems encountered:

- The rule book as the secondary legislation for animal disease control does not meet international standards because the measures to be taken to control rabies are not in compliance with specific recommendations of the WHO and OIE. This makes rabies control in BiH ineffective as important measures to be taken or to be implemented are missing.
- The classification of notifiable diseases in BiH should orientate at the OIE list because list A and B do not exist anymore.
- A major problem concerning the submission and investigation of suspect animals on rabies is that in contrast to the RS the sender (citizen, hunter or veterinary stations) in the FBiH are charged. Because of budget constrains this probably could result in a lower number of submissions of suspect animals to the veterinary laboratories in FBiH. This might be an explanation for the considerable bias in rabies surveillance in certain regions of BiH. Also, rabies surveillance in BiH exclusively relies on public awareness, education and support. This results in an underreporting of rabies cases and consequently in an underestimation of the real rabies incidence in the whole country.

- Although rabies data are inquired and forwarded at different veterinary administrative levels SVO does not have any access to the data as the information flow stops at the level of the entities (Ministries of Agriculture).
- Because information on the total number of animals tested (rabies negatives and positives) at an entity level is only available at veterinary laboratories for rabies diagnosis, veterinary administrations do not have any possibility to evaluate the quality of the rabies surveillance in different region, e.g. municipalities.
- Also, because there is no exchange of rabies data between the two laboratories a complete overview on the rabies situation and surveillance for BiH is not available even at an entity level. The latter case is due to the fact that because of economical reasons (costs, time, logistic) increasing numbers of samples are submitted to the nearest and not to the responsible veterinary laboratory for rabies diagnosis of the entities. In general this approach actually is correct as time is of utmost importance as far as the diagnosis of rabies and possible PEP of humans is concerned. However, it is not sure whether information on the number of submissions and positives is provided to the respective veterinary administrative levels of the other entity.
- Although there is data on rabies available at an entity level (laboratories), there is no permanent epidemiological analysis and evaluation of the rabies situation at a national level conducted in BiH, which would be of utmost importance for any future rabies combat strategies.
- Because there is no exchange of samples between the two laboratories for rabies diagnosis established yet, the laboratory in Banja Luka does not send samples for confirmation of rabies diagnosis to the official national reference laboratory for rabies in Sarajevo. In fact, confirmation of rabies diagnosis for the RS is conducted by the national reference laboratory of a neighbouring country, e.g. Serbia.
- Inadequate financial budgets for the two responsible veterinary laboratories for rabies diagnosis do not allow proper rabies diagnostics, e.g. confirmatory tests for rabies diagnosis (RTCIT, RT-PCR), serological tests, ring tests, typing of rabies virus isolates. As a consequence, there is no diagnostic basis for the implementation of a national rabies eradication program based on oral vaccination of foxes available at the moment.
- As far as the currently implemented measures on rabies control are concerned, the monitoring (and not quarantining) of unvaccinated contact animals (dogs, cats, domestic animals) at the yard of owners for 15 days is inadequate. This time period does not consider the considerable variability of the incubation period of rabies (weeks to months) upon this other European countries have established six month quarantine for contact or suspect animals. As a consequence, it can happen that those animals still can suffer from rabies and pose a threat for human beings.
- The generally applied disinfection procedure of “infected areas” after the detection of a rabies case is inadequate and is motivated only for psychological reasons. The RABV does not have a high tenacity and is destroyed by UV-light within a few hours. Hence, this measure does not contribute in any respect to rabies control in the respective area and to human rabies prevention.
- There is not exact definition of an area at risk (restriction zone).

- The lifting of measures after the detection of a rabies outbreak is not based on any active surveillance data but only on time. It is a matter of fact, however, that there are more cases behind each detected rabies case in area that go undetected. Hence, if no appropriate surveillance focussing on indicator animals is established the real rabies incidence in an area can not be determined.
- Several factors, e.g. missing dog register, costs for vaccination to be paid by the owner, poor public education, restricted obligatory vaccination of service dogs, and high number of stray and ownerless dogs contribute to the low vaccination coverage in pets and farm animals. This results in a high risk of rabies transmission to humans and a high number of PEP.
- There is national concept on the management of stray dogs and cats. These animals represent a high risk for human infections.
- The general lack of contacts and exchange of information on rabies data between veterinary and public health services at different administrative levels throughout BiH result in an insufficient public awareness and cost-intensive PEP. More important is the fact that rabies as zoonosis is therefore also not sufficiently recognised as a public threat and therefore no financial basis is installed.

8. Conclusions

Animal rabies cases are registered in all cantons and districts of BiH. Hence, rabies is endemic throughout the whole country with the fox as the principle main reservoir. Based on the rabies situation and the problems encountered rabies control in BiH is considered ineffective as there is no basis for a successful implementation of a national eradication program for rabies at the moment. Hence, rabies in BiH poses a serious health threat and economical problem.

As in other European countries, rabies in BiH can be eliminated using a focused and sustained eradication strategy supported by international organisations, a well functioning national veterinary / medical infrastructure and with sufficient governmental financial support. However, the necessary foundation for a successful implementation of a national rabies eradication program urgently need to be laid in the near future.

To meet international standards and comply with requirements for the implementation of a national rabies eradication program the short-term experts recommend the following:

1. Intensive collaboration between ministries (SVO, Ministry of Health, Ministry of Environment and Forestry, and Ministry of the Interior) concerned with rabies control should be set up with respect to exchange of information, data, knowledge and expertise.
2. It is strongly suggested to establish a national committee on rabies control. The committee should comprise representatives of the above mentioned authorities and scientists from the respective laboratories for rabies diagnosis in RS and FBiH as well as from universities. The objectives of this committee are to:
 - (i) increase public awareness and education on rabies throughout BiH,
 - (ii) persuade politicians to recognise rabies as a societal problem and to establish political commitment on rabies control in BiH,
 - (iii) enhance contacts and exchange of information on rabies data between veterinary and public health services at different administrative levels and
 - (iv) to coordinate measures in rabies surveillance and rabies control.
3. The committee shall meet at a regular basis. As starting point the committee should organise a national conference on rabies for BiH with participation of neighbouring countries and also should define the preconditions for a start of a national eradication program.
4. There is an urgent need to reconsider the still existing rule book and to replace it with a more specific secondary legislation meeting international standards. The implementation of a national legislation on rabies control in BiH is essential for future rabies control strategies following recommendations of the WHO and OIE.
5. There is a need to establish an epidemiological group of scientists which is solely concerned with rabies epidemiology. This group should comprise people from the respective regional laboratories for rabies diagnosis and the Veterinary Faculty.
6. An appropriate rabies surveillance system meeting international standards (4 foxes/ 100 km² and year) needs to be established. Rabies surveillance data (including negative samples) should be based on laboratory confirmation and should be based on examination of indicator animals independent of the species (showing clinical signs, suspect of being rabid, found dead, road kills, and animals with biting incidence to humans). Collation of negative results is to be established as it is of utmost importance for the evaluation of the quality of rabies surveillance.
7. Rabies surveillance and control is an official governmental duty; hence, rabies diagnosis should be free of charge throughout the country. This will avoid bias in rabies surveillance in certain regions and increase public awareness and support.
8. Effective reporting of human as well as animal rabies cases and unrestricted exchange of data between all veterinary administrations, laboratories and public health levels and entities needs to be established.
9. Adequate funding of the regional laboratories for rabies diagnosis needs to be guaranteed by the government to allow proper rabies diagnostics. Standard and state-of the art confirmatory techniques need to be established in both laboratories for rabies diagnosis.

10. With respect to rabies surveillance, diagnostics and research the position and role of the national reference laboratory for rabies (NRL) is to be strengthened. Rabies needs to be confirmed only the national reference laboratory for rabies in BiH. The NRL with support of the veterinary faculty should conduct a proper epidemiological analysis of the rabies situation of the past 10 years to identify problems, shortcomings and other deficiencies.
11. The monitoring of unvaccinated contact animals (dogs, cats, domestic animals) at the yard of owners need to be revised and adapted according to international standards (quarantine of 6month).
12. The currently applied disinfection procedure of "infected areas" should be abolished. Instead prophylactic measures should focus on comprehensive public education. Also, in case of a rabies outbreak the area at risk (restriction zone) needs to be defined.
13. The lifting of measures or restrictions after the detection of a rabies outbreak needs to be based on active surveillance.
14. In a first step, any efforts need to be undertaken to increase the vaccination coverage of the dog population in order to minimise the risk of transmission of rabies from domestic animals to humans.
15. The number of vaccine doses must be based on reliable dog population density estimates and constant numbers of vaccine doses need to be delivered annually to the cantons / municipalities. Therefore, the establishment of a dog register is basic requirement to reach this goal.
16. The vaccination coverage in pet and farm animals should be increased as follows:
 - (i) vaccination of animals free of charge (It is strongly recommended to take the municipality of Tuzla and the district Brcko as a prime example),
 - (ii) provision of a financial basis for free-of charge vaccination at a state level,
 - (iii) implement restrictions for unvaccinated pet animals in infected areas (movement restrictions, animals are not allowed to be on the loose etc.),
 - (iv) increase public awareness on the necessity of preventive rabies vaccination of pet and farm animals and their benefits
 - (v) use media (radio, news papers, television etc.) to announce annual vaccination campaigns
 - (vi) consequent documentation of parenteral vaccination should be enhanced for both the dog owner and the Veterinary Station.
17. Start initiating a concept on the management of stray dogs and cats in cooperation with the national committee on rabies control and NGOs. The best way to control the stray dog population is to control their food resources (no access to garbage) and to use sterilisation and/or immunocontraceptive technique as an additive control measure. In case, those dog population control measures seem to be inapplicable under BiH conditions, next to the parenteral mass vaccination of owned dogs oral vaccination of stray dogs should be considered as an alternative method of rabies control following guidelines of the WHO. However, the authorities should be able to use culling of stray dogs in emergency situations.

As in the future rabies control measures and rabies elimination have primarily to focus on the fox population, it is recommended that SVO should communicate with other European countries having successfully established national rabies eradication programs to start

providing the basic requirements for the a successful implementation of oral vaccination of foxes in BiH.

9. Date and Signature of Expert

Date: 15th February 2007

Dr. Thomas Müller

Dr. Jörg Fritzemeier

Dr. Josef Diekmann