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Directorate G – Veterinary and International Affairs
Unit G5 Food chain and animal health expenditure

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REPORT OF THE

“Brucellosis”

TASK FORCE SUB-GROUP

Meeting held in

Skopje

Former Yugoslav Republic of Macedonia

14-15 May 2013

**REPORT OF THE
MEETING OF THE BRUCELLOSIS SUB-GROUP OF THE
TASK FORCE FOR MONITORING DISEASE ERADICATION
HELD IN SKOPJE, Former Yugoslav Republic of Macedonia, 14-15 MAY 2013**

PARTICIPANTS: see Annex I

AGENDA: see Annex II

LOCATION: Food and Veterinary Agency, Skopje

Objectives of the EU-Task Force Brucellosis sub-group in Former Yugoslav Republic of Macedonia:

This is the first time that the brucellosis-task force is organised in a non-EU MS.

As explained by a member of the European Commission and by the chairman of the subgroup, at the beginning of the meeting, the scope of the visit is to share information and experience of the expert members with the hosting colleagues as well as to give technical support if needed or requested by the visited country. After the visit a report is issued by the experts, based on the information provided on the spot by the country and on the findings verified directly by the experts themselves during the visit.

The main goal of the Task Force is to leave at disposal of the visited country the expertise of its expert members, in the light to give a contribution, with an external independent technical assessment, in the evaluation of strength and weaknesses of strategies and measures in place for the controlling and eradicate the disease concerned. Conclusions and recommendations are formulated from a general point of view and are proposed in the report with the main scope to be a basis for the Veterinary Services of the visited country to reflect on the possible improvement of different aspects of the control and eradication programme for the disease concerned. The country visited may amend the program accordingly to what it is suggested by the Task Force, or it may choose other approaches, also in consideration of social and economic factors that may influence the success of the measures adopted, and which are not in the remit of the Task Force.

Conclusions and Recommendations are related to the picture of the situation as resulted during the visit based on the information provided by the country visited on the spot. Further developments of the country's situation may be the subject of a following visit aimed to get updated information and new feedback from the Veterinary Services.

The reports of the TF held in different countries in the last years are published on the following website. (http://ec.europa.eu/food/animal/diseases/index_en.htm)

DAY 1

Opening

Dr. Dejan Runtevski, Director of Food and Veterinary Agency, opened the two-day meeting with a salutary speech. Prelude of meeting from a member of the European Commission side was followed by a short presentation of the participants.

1. Presentation of the Food and Veterinary Agency (FVA) structure and organization.

Dr. Svetlana Tomeska-Mickova, Head, Normative and Legal Affairs Department – Food and Veterinary Agency - Skopje.

The organisation and responsibilities of FVA were presented to the group. The FVA has been established in 2010 by the food safety law and has become fully operational in 2011. FVA is the national competent authority for:

- activities related to food and feed safety and control of the quality of food (with exception to primary production of plant origin);
- veterinary activities related to animal health;
- identification and registration of animals;
- protection and welfare of animals;
- animal by-products;
- veterinary medicinal products;
- other activities significant for the veterinary health, food and feed safety.

The FVA is currently structured in seven departments, three independent units and 28 regional offices. Regional offices have local official veterinarians (for animal health issues) and food inspectors. The structure is shown in **Figure 1**.

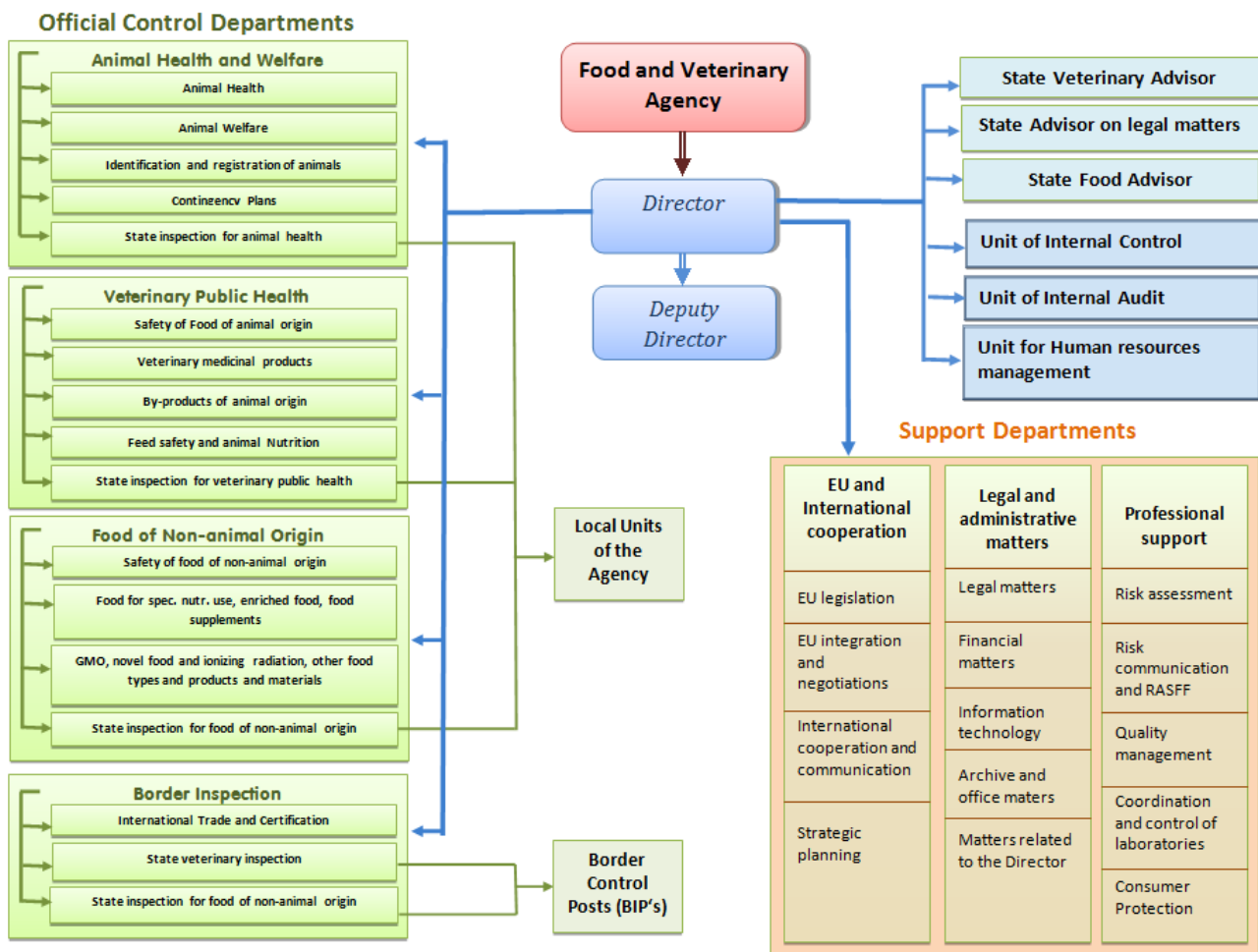


Figure 1. Organisational structure of FVA.

The current number of employees is 294 (90 at central offices and 204 in regional offices and BIPs). Laboratory analysis on samples collected in the context of official controls are carried out by the laboratories of the Faculty of Veterinary Medicine in Skopje or by the Public Health Institute, also located in Skopje. Analyses are performed according to ISO/IEC 17025:2006 accredited methods.

2. Presentation of structure and national distribution of bovine and ovi-caprine livestock

Dr Ilir Veseli, Acting Head, I&R Unit – Animal Health and Welfare Department, Food and Veterinary Agency - Skopje

a. Distribution of ovine and caprine livestock

The total number of sheep and goats is 785,959 heads in 9,337 mixed flocks in 2013. The total population number seems to be decreased in relation to the previous years. This population includes 724,688 sheep and 61,271 goats distributed in 82 municipalities. In the same time, there are almost 22,800 more holdings without animals (inactive flocks). The biggest number of flock is allocated in the Municipality of Vinica with 737 holdings and the Municipality of Kriva Palanca follows with 463 holdings, both found in the “green zone” of the S&G Brucellosis programme. However, the two more populated Municipalities by sheep and goats are Prilep and Stip with 47,647 and 32,422 animals respectively. Stip is found in the zone implementing mass vaccination, while Prilep is found in the southern part of the Country, in the zone where vaccination of only replacement animals takes place. The sheep and goat population consists of almost sixteen different breeds, mainly milking and meat production breeds and their crosses. Common sheep breeds are Ovchepole,

Wurttemberg, Sharplanina and their crosses. Common goat breeds are Sannen, Alpine and autochthones breeds. The main sheep breed is "Ovchepole" (27,1%, 200,800 sheep). The 35% of the holdings consists of very small holdings with 1 to 10 animals, but having a very low total of animals (only 10,897). The majority of the holdings (37%) have from 11 to 100 animals (**Figure 2**) and in grand total 159,154 sheep and goats. On the other hand, the majority of the animals (49%) are found in holdings from 101 to 300 animals (**Figure 3**). Finally, there is a 5% of very big holdings (more than 301 animals within) having the 30% of the whole animal population.

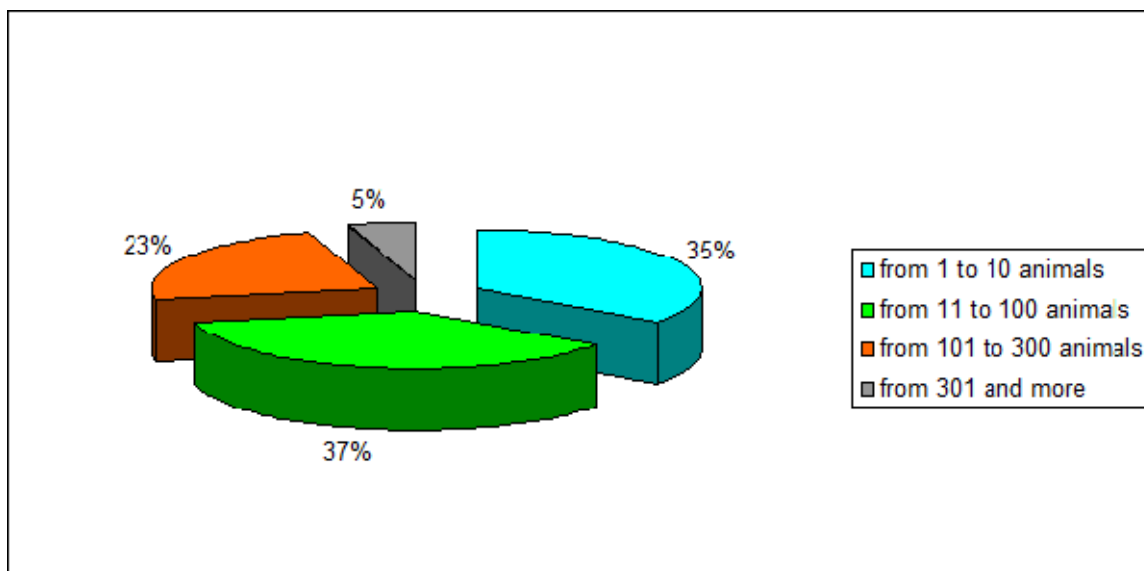


Figure 2. Year 2013. Distribution of ovi-caprine holdings according to flock size. Country level.

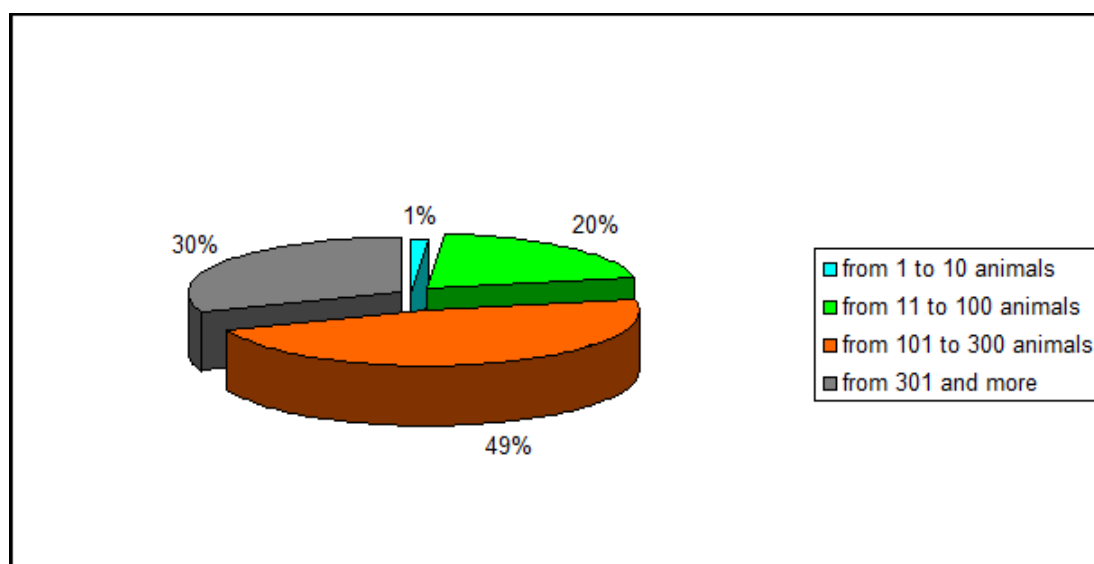


Figure 3. Year 2013. Distribution of ovi-caprine heads according to flock size. Country level.

b. Distribution of bovine livestock

The total number of cattle is 261,073 heads in 40,868 herds in 2013. This population is distributed in 84 municipalities. In the same time, there are 24,283 more holdings without animals (inactive herds). These figures are overestimated, since numbers of holdings and animals are still present in the database while these

farms have ceased their activity. Therefore, the real figures, according to the FVA should be for 2013, 212,323 animals in 26,298 holdings.

The highest number of herd is allocated in the Municipality of Gostivar with 1,889 holdings and the Municipality of Kumanovo follows with 1,854 holdings, in the northern part of the Country. However, the two more populated Municipalities by bovines are Bitola and Cucer-Sandevo with 15,794 and 15,784 animals respectively. The Municipality of Bitola is found in the southern part of the Country. It is obvious that the Municipalities with many holdings have not the proportional number of animals. The same characteristic happens to sheep and goat distribution, as well. This is because there are a lot of owners with one or two cattle for familiar use. The bovine population consists of almost eight different breeds, mainly milking and meat production breeds and their crosses. Common breeds are Holstein Friesian, Busha, Simmenthal and their crosses. The more often breed is "Holstein Friesian" (41%, 103,628 cattle). The majority of the holdings (88%) consist of very small holdings with 1 to 10 animals, having in total 118,118 of animals. The 11% of the holdings have from 11 to 50 animals and in grand total 90,445 cattle (**Figure 4**). Finally, there is a 1% of big holdings (more than 51 animals within) having the 20% of the whole animal population (**Figure 5**).

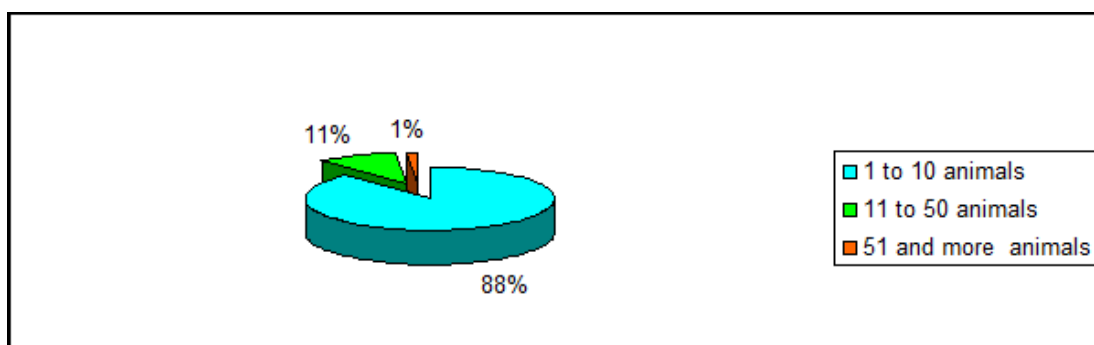


Figure 4. Year 2013. Distribution of cattle holdings according to herd size. Country level.

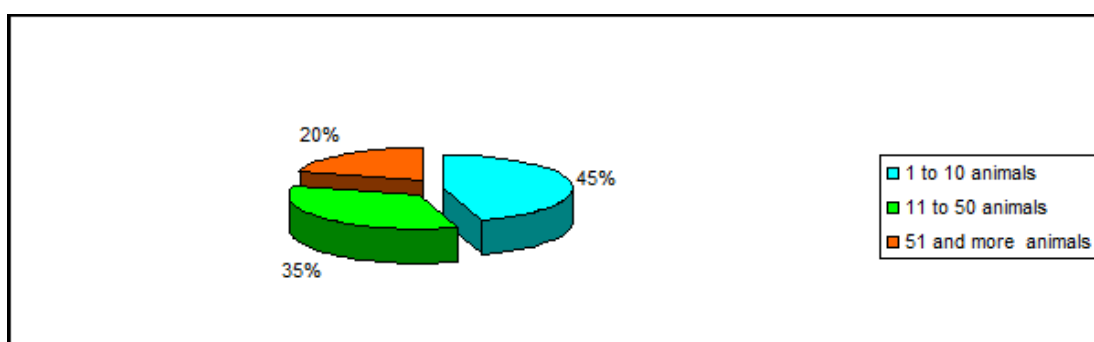


Figure 5. Year 2013. Distribution of cattle heads according to flock size. Country level

3. Bovine Brucellosis: presentation of national legislation and of the results of the brucellosis control programme implementation — Overview of the evolution, current situation and perspectives.

Dr. Toni Kirandjiski Head, Animal Health and Welfare Department – Food and Veterinary Agency – Skopje.

The Food and Veterinary Agency (FVA) is the Competent Authority for the implementation of animal health, eradication and control programmes according to national legislation. Bovine Brucellosis and Tuberculosis programmes have been implemented since 2007 in accordance with Directive 64/432/EC. This includes the following: database, individual identification, movement control of all bovines, computerised management of test results and herd classification (status for Brucellosis) in the database. Official veterinarians of FVA are responsible for the implementation and control of the programmes at regional level. The programme uses a test-and-slaughter policy; no vaccination against brucellosis is implemented. No distinction is made between milk-, meat production and mixed holdings. Pre-movement testing is not in place. Animals moving must only originate from holdings where all animals gave negative results in the previous year and all animals that have entered the holding came from holdings with same status (animal health certificate issued). Annual serological testing is carried out by private practitioners. All cattle over 6 months old are tested. Bulk milk testing is not implemented. Laboratory testing is carried out at the National Reference Laboratory for Brucellosis, located at the Faculty of Veterinary Medicine in Skopje. In accordance with Directive 64/432/EC, Annex C, blood samples are tested using the Rose Bengal test (RBT) as a screening test. Positive samples to RBT are retested using complement fixation test (CFT) or the i-ELISA test as a confirmatory test. In some cases *Brucella abortus* has been isolated. In one outbreak two years ago also *Brucella melitensis* was found in cattle. No detailed information on *Brucella* isolation and typing is available. Herds and cattle are subject to movement restrictions in case of a positive or inconclusive blood test result, suspicion of infection on the holding, clinical symptoms (abortions) or putative contact with infected cattle. Following the finding of positive blood test result, the reactor is isolated prior to slaughter. Disinfection in the holding after removing of all positive animals is carried out by a private practitioner. Compensation for slaughtered cattle is 100% of market value. The compensation is composed of the meat value (about 0.70 cent per kg), plus government compensates the remaining (max. up to 1,000 €) so to reach the market value. For budget reasons stamping out is not a commonly used option in the Country. Control measures following disclosure of infection include the following: forward and backward tracing, sampling of sheep (if present) and epidemiological investigations. Positive herds are tested 30 days after slaughtering of the last positive animal and then test frequency is lengthened to 2 months. Test coverage at herd and animal level is not 100%, but it is difficult to evaluate due to the discrepancies between the database and the real number of existing holdings (see above). No information is available on the selection of the herds to be tested annually. The number of positive herds is slightly decreasing while the number of positive animals is not decreasing (**Table 1**).

Table 1. Bovine Brucellosis – animal/herd prevalence, number of slaughtered cattle.

Year	No. of tested animals	No. of positive animals	% of positive animals	No. of positive herds	No. of slaughtered animals
2010	168.682	663	0.39%	78	665
2011	147.615	225	0,15%	66	229
2012	144.619	416	0,29%	64	357

Bovine brucellosis outbreaks occurred during last two years scattered in most regions (Error! Reference source not found.). Out of the 64 positive herds in 2012, in 15 herds only one infected bovine was detected.

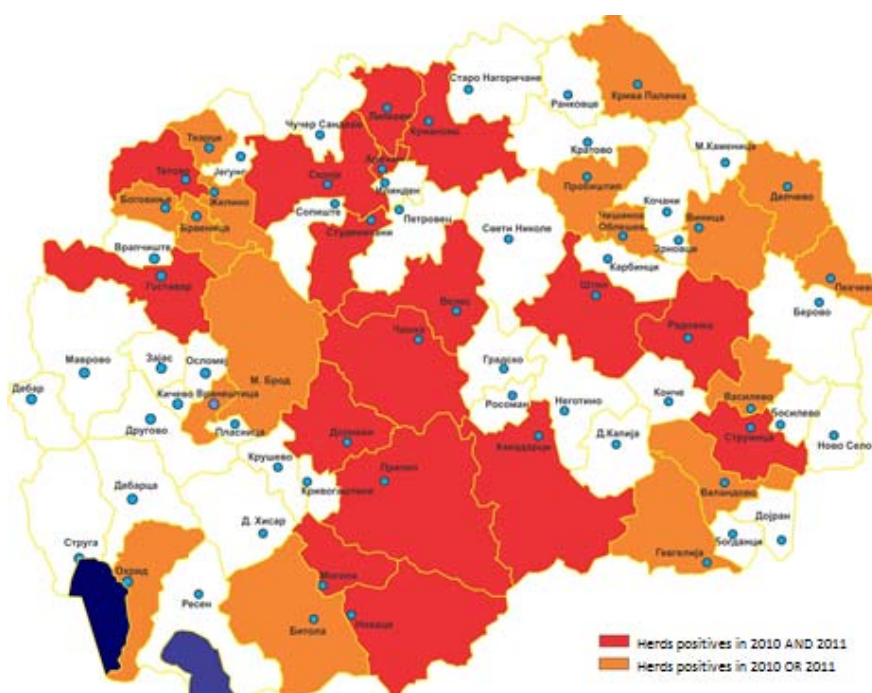


Figure 6. Geographical distribution of outbreaks of bovine brucellosis in 2010 and/or 2011.

4. Sheep and goats Brucellosis: presentation of national legislation and of the results of the brucellosis control programme implementation – Overview of the evolution, current situation and perspectives.

Dr. Toni Kirandjiski Head, Animal Health and Welfare Department – Food and Veterinary Agency – Skopje.

Before year 2008 a test-and-slaughter policy was implemented in the whole Country for sheep and goats brucellosis, using RBT as a screening test and CFT or ELISA as confirmatory test. Positive animals were compensated at 100% market values. However, difficulties were encountered in the implementation of the programme, mainly due to lack in movement controls and in the animal identification. The number of positive animals reached a peak of 18,978 in 2007, with 380 human cases recorded in the same year (around 19 cases/100,000 inhabitants). Controls were decreasing during years in the period 2004-2007 (**Table 2**).

Table 2. Number of villages tested for sheep and goats brucellosis and number of villages found infected. 2004-2007 period.

	2004	2005	2006	2007
Tested villages	967	1066	662	273
Infected villages	323	256	158	62
% of infected villages	33.4%	24.0%	23.9%	22.71%

A number of drawbacks were during the test-and-slaughter policy implemented before 2008:

- Only a proportion of villages (and flocks) were tested and they were not representative;

- Retesting in positive flocks was not performed continuously;
- Animals were not permanently identified;
- Positive animals were not removed consistently;
- Diagnostic test system (RB as screening and CFT or ELISA as confirmatory) was considered as expensive;
- Timely removal of reactors and their compensation required important financial resources

Considering that sheep and goats brucellosis is widely spread in the Country and that disease prevalence and absolute number of infected animals differ between regions, the Competent Authority decided to adopt a new strategy in 2008, with a combination of vaccination and test-and-slaughter policies.

Based on the disease situation as revealed during testing carried out in the 2004-2007 period, the Country has been divided in three areas (**Figure 7**):

- Regions where the disease was not present or was present with very low prevalence;
- Regions where the disease was commonly present with low or medium prevalence;
- Regions where the disease was present with high prevalence.

In regions with no disease occurring or occurring with very low prevalence, it was decided to keep the current test-and slaughter policy and vaccination ban, continuing the testing on all sheep and goats older than six months, with the final aim to reach the officially brucellosis-free (OBF) status. In regions in which the disease was present at low or medium prevalence the following measures were implemented:

- Vaccination of replacements (3-6 months old), identified with special eartags;
- Vaccination of adult sheep and goats forbidden;
- Movement of vaccinated animals banned four weeks after vaccination
- Slaughter of vaccinated animals allowed three months after vaccination
- Testing of sheep and goats older than 6 months

This strategy was planned to be adopted in these regions for at least five years with the aim to reach the brucellosis-free (BF) status and, after, to come back to the previous measures directed to gain the OBF status.

In regions in which the disease was present at high prevalence, it was decided to carry out a mass vaccination in 2008, followed by the vaccination of replacements for at least five years and latter considering the restoring of the test-and-slaughter policy.

Detailed results on the first two years of implementation (2008 and 2009) were presented. The number of positive flocks increased (**Table 3**), while the absolute number of positive animals decreased (**Table 4**).

Table 3. Number of sheep and goats flocks tested for brucellosis and number of positive flocks. 2008-2009 period.

Year	Tested flocks	Positive flocks	% of positive flocks
2008	6,345	652	10.28%
2009	6,012	692*	11.51%

*197 flocks with only one positive animal



Figure 7. Classification of regions adopted in 2008 according to sheep and goat brucellosis prevalence

(green= no disease or very low prevalence; yellow=low or medium prevalence; red= high prevalence)

Table 4. Number of sheep and goats tested for brucellosis and number of positive animals. 2008-2009 period.

Year	Tested animals	Positive animals	% of positive animals
2008	596,213	16,052	2.69%
2009	543,011	9,606	1.77%

The conclusions of the competent authority after the first two years of implementation were that the new strategy had limited success in decreasing of the number of positive flocks but resulted in an improvement in the within flock control. Major advantages were the decrease of human cases as well as the saving of financial resources for compensation.

An amendment in the current strategy was adopted in 2010, consisting in adding 3 new regions to the mass vaccination area and to apply this strategy in epidemiological units based on risk analysis (cluster of villages, one village, and cluster of flocks or single flocks). After year 2009, all the figures (number of tested flocks, number of tested animals, number of positive flocks, number of positive animals, number of human cases) show a decrease.

Next steps foreseen by the FVA are to evaluate the results that will be achieved in 2013, and to consider the adoption of a revised approach, increasing the public health efforts, strengthening animal I&R and movement

control, introducing classification of sheep and goats flocks according to EU legislation, and preparing for phase out of vaccination strategy.

5. Presentation of structure and national distribution of bovine and ovi-caprine livestock

Dr Ilir Veseli Head, I&R Unit – Animal Health and Welfare Department, Food and Veterinary Agency - Skopje

A comprehensive Animal Identification and Registration System (I&RS) was first started in cattle in 2004, followed by the inclusion of small ruminant species in 2008.

In 2012, the whole scheme was reviewed by law with the aim of rectifying the observed shortcomings of the system, by incorporating an active participation of Veterinary Chambers, authorized private veterinarians and farmers. The latter are now, in some cases, authorized to identify animals born in their holdings. In addition, the new Law of Identification and Registration of Animals (26th July 2012) includes other food-supplier-domestic species (swine, equine, poultry, bees, aquaculture) and pets. The Law is in line with EU Legislation. Additional secondary legislation has come into force (Book of Rules) for any particular sector and also for licensing procedures of holders for animal identification and entering data on the database, and for licensing procedure of enterprises for distributing means of animal identification. However, current Book of Rules for cattle and sheep and goats are still under the old system although the adaptation is almost finalized.

The new Law foresees the role of authorized private veterinarians, as the core of the identification and registration system, with responsibilities in the direct implementation, under the supervision and audits from official veterinarians. The basic instrument of management and supervision is a Central Electronic Database (CED) that fully integrates identification and registration information, animal health information and movement documents.

The designation of private veterinarians to operate in the system has been changed from a tender's procedure to an authorization procedure where any private veterinarian can apply if he/she fulfilled a number of requirements. Also Veterinary Stations (private enterprises of veterinarians) can be authorized.

Since 2013, the cost of the identification and registration system is fully covered by the breeder (e.g. ear-tags, identifications instruments, and documents, manpower).

Therefore, the primary elements of the system are:

- Central database (new version was released on 18th February 2013);
- Means of animal identification (individual or group);
- Farm register for any animal holding (special register for every species); and
- Animal movement documents (Health Certificate) and passport.

The main items of cattle, and sheep and goat identification and registration can be summarized as follows:

Cattle identification and Registration System

1. Registration of all holdings in CED
 - Data of keepers and holdings;
 - Issuing ID card of holding and Unique Holding Number.
2. Calf identification
 - Two ear-tags (FVA, MK 7 digit individual number plus check digit)
 - Apply within 20 days of birth.

3. Cattle passport
 - Issued by FVA – Authorized Veterinary Stations-Private Veterinarians within 14 days of registering birth or import of animal
 - Signed and sealed by Official Veterinarian – checks of the deadline
 - Passport always follows the cattle – after death returns to competent authority (FVA – I&R Unit)
 - Temporary movement documents for calves – 21 day.
4. Movement of cattle
 - Movement document: Health certificate and passport.
 - Reporting to database: within 7 days with copy of health certificate.
5. Farm register
 - Holding and keepers data
 - Animal data (Animal ID, breed, sex, date of birth and death, Mothers ID)
 - Data for movements of animals on/off holding.
 - Birth and death of animals

Sheep and goats Identification and Registration System

1. Registration of all holdings in database
 - Data of keepers and holdings (personal data)
 - Issuing ID card of holding and Unique Holding Number.
2. Identification and registration of small ruminants
 - Two ear-tags within 6 month of birth or 9 month for extensive bred animals (FVA, MK, 8 digit individual number plus check digit and barcode).
 - One ear-tag within 12 month for animals intended for slaughter (FVA, MK and 9 digit holding number for bigger holdings or 9 digit individual numbers).
3. Movement of sheep and goats
 - Movement document (Health Certificate).
 - Reporting to database: within 7 days with a copy of Health Certificate.
4. Farm register
 - Holding and keepers data
 - Animals data (Animal ID, breed, sex, date of birth and death, ear-tag replacement data)
 - Data for movements of animals on/of holding.
 - Data of inventory (reporting with copy of farm register to database).

Stakeholders of the I&R.

The Food and Veterinary Agency (Unit of Animal I&R, local official veterinarians) is the competent authority for implementation of professional and administrative matters relating to I&RS. Its responsibilities are:

- Preparation and implementation of legislation.
- Establishment and maintenance of the Central Electronic Database.
- Provide technical specifications for the establishment and maintenance of the system.

- Authorize other stakeholders who will directly participate in the maintenance of the system for I&R (authorized suppliers of means of identification, authorized veterinary organization and authorized keepers).
- Monitoring and audit of the work of all participants in the system with the help of analysis and reports
- Preparation of annual plans (frequency based risk analysis) and implementation of mandatory inspections by official veterinarians to all participants in the I&R system.
- Issuing of annual report on controls carried out.

Authorized private veterinarians and private veterinarians enterprises (AVS) should be authorized by the FVA and have contracts with keepers of animals in accordance with the Law of Veterinary Health. They have the following responsibilities:

- Order and provide the breeders with means of identification and other documents.
- Identify the new-born calf and enter the data into an electronic database within 20 days from the date of birth of the animal.
- Issue cattle passport within 14 days of registration of birth or import of animal.
- Enter data in the database within five days of receipt of data (animal identification, movement, death, changed holding data, holding inventory etc.).
- Prepare and hand over documents to keepers (ID holding card, movement document and other) - within 10 days.
- keep a record of the means of identification and other documents

Breeders have the following obligations:

- Register the holding and report to competent authorities all changes related to holding and keepers data;
- Allow access to all animals and premises, identification and registration data and documents at the request of the Agency;
- Tag all animals in accordance with the legal provisions;
- Report movements from his holding through the electronic database or through the authorized veterinary organization within 7 days (departures and arrivals of all animals, birth and death of cattle)
- Move in/out farm only animals that are accompanied with proper documentation.
- Carry out holding census (sheep/goat, pigs and bees) and submitting data of inventory to competent authority within 25 days; and
- Keep the farm register up to date (enter all data related to holding, keepers, animals, movements and inventory).

Controls and audit scheme.

Controls are performed on all participants in the system:

Farmers

- On-the-spot control of holdings on annually basis, selected by means of the Central Electronic Database: Cattle - 10% of all farms in the Country; Sheep and goats - 5% of all farms or 3% of holdings which covers 5% of all animals in the Country.
- Checks: management of the farm register, deadlines for animal I&R, deadlines for reporting to database, documents from I&R system (holding ID card, movement documents, passports, inventory forms, etc.).

Slaughterhouses

Checks: arrival of properly ear-tagged animals with the corresponding movement documents and passports, management of records, on time reporting of slaughtered animals or on time entering data in database.

Livestock market

Checks: arrival/departure of properly ear-tagged animals with the corresponding movement documents and passports; up- to- date farm register, on time entering data in database.

Authorized private veterinarians and private veterinary associations

Checks:

- Fulfilment of terms of reference of contracts with breeders.
- Deadlines of I&R of animals.
- Deadlines of entering data (birth / death, census, data movement, changes relating to holding)
- Deadlines for issuing of documents to the keepers and to the FVA.
- Proper keeping of means of identification (charged ear tags/already-applied/in stock, abuse of the ear tags and database), I&R documents, storage and management of personal data.

Suppliers of means of identification.

Checks: terms and conditions of means of identification of animals, fulfilment of terms of reference specified under the contract with FVA (quantity in stock, delivery deadlines of means of identifications to AVO or keeper, management with database).

Cattle, Sheep and Goat Population at Country level.

Main figures are reported in Table 5 and 6. For detailed information related to the existing livestock heads, number and size of holdings, and regional distribution, as well as additional information regarding movement statistics, livestock breeds etc. please refer to Annex 1 (Excel file).

It is necessary to stress that the total population of cattle and small ruminants is currently overestimated, given that a proportion of animals and holdings are not currently declared, or are not recorded by the I&R system, and, conversely numbers of holdings and animals that do not exist anymore are still in the database. The FVA expect that the new CED will overcome this important shortcoming.

**Table 5. Population of Cattle and Small Ruminants
at National level. Number of heads.**

Cattle		
Year	Total number of holdings with animals	Total number of animals
2012	40,916	261,073
2011	41,682	267,911
2010	41,836	255,491

Sheep/goats		
Year	Total number of holdings with animals	Total number of sheep/goats
2012	8,734	765,062
2011	10,497	809,960
2010	12,684	828,941

**Table 6. Distribution of Cattle and Small Ruminants
at National level according to Holding Size.**

	Number of holdings	%	Number of small ruminants	%
from 1 to 10 animals	3,271	35.03	10,897	1.39
from 11 to 100 animals	3,434	36.78	159,154	20.25
from 101 to 300 animals	2,161	23.14	376,208	47.87
from 301 and more	471	5.04	239,700	30.50
Total	9,337	100.00	785,959	100.00

	Number of holdings	%	Number of cattle	%
1 to 10 animals	35,983	87.95	118,118	45.24
11 to 50 animals	4,403	10.76	90,445	34.64
51 and more animals	529	1.29	52,510	20.11
Total	40,915	100.00	261,073	100.00

6. Presentation of the national veterinary information system.

Dr. Greta Nikolovska, Animal Health Unit - Animal Health and Welfare Department, Food and Veterinary Agency – Skopje.

The veterinary information system (VIS) is a tool for managing the activities to be carried out in animal health either by the authorised veterinary clinics (private vets) or by official veterinarians. The software package is mainly dedicated to activities to be performed in the framework of the existing control plan for brucellosis control in cattle, sheep and goats and the existing plan for tuberculosis in cattle. It covers also all activities related to the responsibilities of the FVA (in animal health). Therefore, the VIS covers also other activities in relation to the work of private veterinarians and OV's in animal health including reporting of outbreaks, vaccination data, animal welfare, payments for slaughtered animals, payments for private veterinarians, etc. Specially designed modules have been developed for these diseases.

Private vets have at disposal a search form for pending tasks to be consulted before going to carry out the activities in the field related holding with which they have a contract. The case of testing for brucellosis and tuberculosis an holding with unknown status was shown. The system recalls the animals IDs from the I&R database and provides the form that will be used in the field when collecting the samples. The form can be printed with the data present in the I&R database, or, in absence, the system can produce a blank form which will be filled in the field. Later on, these data can be entered in the system. The form to be used in the field contains (and the system stores information about) several information such as the holding number, the name of the owner, the current status of the herd (as far as brucellosis and tuberculosis are concerned), the date of achievement of that status, the ear-tag numbers of animals present in the holding, the veterinary clinic collecting the samples, etc. The samples have to be identified with barcodes, so the private clinics are provided by the veterinary services with forms containing two barcode numbers in each row as stickers. When the animals are sampled, the veterinarian will put the first barcode label on the tube and the second barcode number on the form. After blood collection or tuberculin skin test the form, completed with missing data, is used by the vet back in the office to enter these data in the system as well as the barcode numbers. The ear-tag numbers are proposed by the system and the veterinarian will add the barcode numbers beside the

related ear-tag number on the form. The barcode number is a pre-generated running number actually representing the sample number for the laboratory. This is in order to avoid the laboratory having information about the ear-tags of the animals currently under testing. Once barcodes numbers are entered in the system, the order to the laboratory to analyse the samples can be generated. The laboratory can test the samples only if he receives the electronic form, otherwise it is not able to enter the results in the system. This system is also connected with the payment in the sense that the FVA will not pay the samplings to the private veterinary clinics if the data are not entered in the system or if it is not done in a due time. The results entered by the laboratory are then at disposal of the official veterinarians and the status is automatically switched from B1 (unknown) to B2 (last negative control). The system will then propose the next sampling date to reach the status B4 (officially free). If this second test is negative the status will be automatically changed to B4 by the system. The system is designed to store also information about vaccination, even if currently vaccination against brucellosis is forbidden for cattle in the Country. In case of positive results the system will automatically change the status to B+ (infected) and proposes to the official vets the actions to be taken (pending tasks) such as slaughtering of infected animals, epidemiological investigations to be carried out in the holding, etc. The official veterinarian, on its initiative, can create tasks for the veterinary clinics (such as restriction of movements, disinfections, etc.), together with the timeframe in which measures have to be implemented. The inspector has also the possibility to verify if the tasks assigned to private veterinarians have been fulfilled. A GIS System is incorporated in the system and currently it is only incorporating the position of the village to which the holdings are belonging. It is planned in the future to provide a GPS recorder to field veterinarians in order to take the coordinates of single farms.

7. Visit to the Reference Laboratory for Animal Brucellosis - Veterinary Institute. Faculty of Veterinary Medicine, SS. Cyril and Methodius University - Skopje.

Slavco Mrenoski, Head, Veterinary Institute. Faculty of Veterinary Medicine, SS. Cyril and Methodius University – Skopje.

The Veterinary Institute of the Faculty of Veterinary Science in Skopje is the National Reference Laboratory for Animal Brucellosis. In fact, it is the only institute in the Country currently performing laboratory brucellosis diagnosis in the framework of Official Controls, and therefore also acts as routine laboratory under the National Control and Eradication Brucellosis Program. The Institute regularly attends the Annual Workshop Organized by the EU-Reference Laboratory for Brucellosis and participates in the Proficiency Test organized at European Level by this EU-RL.

The Veterinary Institute is accredited by the National Institute for Accreditation (certificate. no. LT-006), which confirms that the requirements of the international standard MKC ISO/IEC 17025:2006 in the field of animal diseases are fulfilled. Within the scope of Brucellosis, the Institute is accredited for SAT, RBT, CFT and indirect ELISA. The Laboratory follows EU and OIE Standards. Reagents suppliers are approved enterprises that also operate in EU. Blood samples for serology and tissues specimens for isolation purposes, accompanied by the relevant documents, are submitted or personally taken by the private field veterinarians working for the program. The Laboratory is connected to the new Veterinary Information System, currently at the final stage of implementation on the spot. The system makes possible the check of identity of submitted samples and also report laboratory results at real time. Brucellosis diagnosis is performed in three main departments: Immunology, Microbiology and Molecular Biology. Currently, Microbiology Department is being adapted to Bio-safety Level II with potential arrangements for upgrading to BSLII+. Class II Bio-safety cabinets

are available. Facilities of the Immunology Department are sufficiently equipped but of reduced dimensions given the significant number of samples to be handled daily. None automation equipment is available. It is divided into two rooms: a room for samples preparation and RBT serology, and a second room for confirmation serology. Actually, RBT is used as screening test and CFT as confirmatory test. Indirect ELISA is used for sera showing anti-complementary activity instead of CFT. The native hapten-based gel precipitation tests (as described in Chapter 2.4.3. of OIE Manual) is performed in some cases in sheep and goats for discriminating the serological responses of infected animals (positive) from those induced in Rev.1 vaccinated animals (usually negative after a given time after vaccination). Currently, additional evaluation studies of performance characteristics of test are carried out in the framework of Rev.1 mass vaccination policy. The isolation and identification of *Brucella* spp. is done following a tandem procedure that combines classical Microbiology for isolation and Molecular Biology techniques for identification (conventional and Real Time PCR). In addition, MLVA is used for molecular epidemiology studies.

CONCLUSIONS

1. The veterinary personnel of the Agency at central level has good skills as well as good knowledge of EU legislation and available strategies to eradicate the disease. However, the shortage of resources at local level could compromise the future implementation of brucellosis eradication programmes, particularly with regards the monitoring of activities and audits of the performance of private veterinarians or private veterinary enterprises.
2. The I&R system is almost in line with the EU legislation, however, it is still not fully implemented. The Central Electronic Database is not fully operative yet and does not contain all existing holdings in the Country.
3. The new veterinary information system is well designed for monitoring Tuberculosis and Brucellosis eradication programmes, however, it is still not fully implemented.
4. Strategies for the eradication of sheep and goats brucellosis are well adapted to the initially estimated prevalence of the disease and its evolution in the recent years. However, the surveillance of the disease in areas where Rev.1 vaccination of kids and lambs is performed is not sufficient for an early detection of epidemiological units with unexpected high prevalence of the disease, where the change of strategy to a mass vaccination policy could be advisable.
5. For cattle, the data provided on testing coverage at animal and herd level is not sufficient to give a complete picture of the situation. Data may be not fully representative, given that a number of animals have not been tested during years. This impedes the selection of the best adapted control and eradication strategy, (*i.e.* between mass vaccination, combined vaccination of calves and test and slaughter of adult animals, or test and slaughter alone).
6. According to the information provided, all cattle older than 6 months are subjected to a serological test. The decision to test animals younger than 12 months has been taken by the Agency with the aim to increase the number of controlled animals. However, testing animals younger than 12 months may lead to inconclusive results.
7. The national eradication programmes for sheep and goats brucellosis and bovine brucellosis are enforced; however, the serological testing seems not to cover the total eligible animal population.
8. Currently, in flocks or herds with confirmed brucellosis infection where tests and slaughter strategy is carried out, parallel testing is not performed while it is a tool for a more rapid elimination of infected animals.
9. Cattle holdings have the possibility to be classified according to their sanitary status as “Officially Brucellosis-free”, as stated in the 64/432/EEC EU Directive. In particular, holdings may be classified as B+, B1, B2, or B4 according to their sanitary status (from infected to vaccinated and to officially-free, respectively). B3 status is not considered because vaccination of cattle against Brucellosis is forbidden in current National legislation. However, a similar classification is not in force for sheep and goat holdings.
10. The I&R system is not yet fully operative and this does not allow getting accurate information with respect to the vaccination or testing coverage.
11. Bacteriology investigation as a tool for confirmation of infection is not used extensively in those areas where tests and slaughter policy is conducted.

12. In unvaccinated herds or flocks where brucellosis infection is confirmed, the total depopulation is not considered as an alternative to test and slaughter strategy, as a tool for a more rapid and efficient eradication of the disease.
13. Data shown about the trend of human brucellosis incidence reveal a remarkable drop in the incidence after year 2008, in which a mass vaccination campaign was started in sheep and goats population. According to data provided, the incidence passed from 24.3 cases/100,000 inhabitants in 2008 to 4.0 cases/100,000 inhabitants in 2012. The occurrence of the disease in man seems mainly related to occupational exposure and to sheep and goats brucellosis infection.
14. The Veterinary Institute – Faculty of Veterinary Medicine, Skopje -, is the approved NRL and the only lab authorised to carry out specific tests for the diagnosis of Bovine Brucellosis. The laboratory has accredited procedures for methods for brucellosis testing on live animals.
15. The currently existing veterinary information system is dedicated to activities to be performed in the framework of the existing control plan for brucellosis eradication in cattle, sheep and goats and the existing plan for tuberculosis in cattle, however, it is still not fully operative at the moment.
16. The compensation scheme (100% of market value) may discourage farmers in implementing bio-security measures.

RECOMMENDATIONS

1. The veterinary services should be reinforced in terms of financial resources to ensure the implementation of the programme at medium and long term.
2. The I&R system should be fully implemented and the contained information refined, so the system can work as a basic tool for monitoring the progress of brucellosis eradication programmes.
3. The need to make the currently existing veterinary information system fully operative for the activities to be performed in the framework of the existing eradication plan for brucellosis control in cattle, sheep and goats should be urgently considered.
4. Efforts should be made to control 100% of cattle herds in order to get a more reliable estimate of prevalence of bovine brucellosis at national level. In order to save resources, it is recommended test animals older than 12 months. Following the example of the work done in the sheep and goats brucellosis programme, after having got a reliable picture of the epidemiological situation, the choice of the best adapted strategy (mass vaccination, vaccination of calves combined with test and slaughter or test and slaughter alone) could consider also on the current resources available.
5. For small ruminants, the efforts made during recent years in eradicating animal brucellosis should be continued and even intensified where appropriate. In areas where a combined strategy of vaccination of young animals and test and slaughter is implemented, the serological testing of 100% of flocks is essential for an early detection of unexpected high prevalence epidemiological units where the control should be reinforced adopting a mass vaccination strategy. Also in low prevalence areas, where vaccination is not applied, test and slaughter strategy should cover 100% of flocks and eligible animals in order to warrant an appropriate containment of the disease.
6. Rev.1 vaccination should not be discontinued in those areas where alternative means for controlling the disease are not available or the prevalence of the disease has not dropped to an acceptable level for

implementing a test-and slaughter strategy. For optimal results, it would be important to reach 100% of vaccination coverage of eligible population during at least 1-2 generations (5-10 years).

7. Careful attention should be paid by FVA in a strict follow-up of the vaccination coverage implemented in the existing control and eradication plan for brucellosis in sheep and goats. Where necessary, local vaccination plans should be revised in order to ensure the covering of the whole population at risk.
8. In flocks or herds with confirmed brucellosis infection animals resulting positive to RBT should be slaughtered regardless to their testing with CFT. If possible, testing should be carried out in parallel, *i.e.* animals positive to either RBT or CFT should be slaughtered.
9. Provisions should be implemented in National legislation in order to allow the qualification of sheep & goat holdings and territories with the status of “officially-free” or “free” as intended in the EU 91/68/EEC Directive.
10. The use of bacteriological confirmation should be improved as a complementary tool to identify infected flocks.
11. Abortions reporting should be encouraged, especially in cattle.
12. Since total depopulation remains the fastest method to prevent spreading of the disease, it should be more frequently considered, particularly when the intra-herd (or intra-flock) infection rate is high.
13. Even if the human brucellosis incidence rate has decreased dramatically after year 2008, it remains still at significant levels thus justifying the need for more efforts in controlling the disease in the animal reservoirs.
14. The competences of the NRL for brucellosis, as well the equipment, should be reinforced. In particular, the fully implementation of the connection of the laboratory information system with the veterinary information system should be urgently considered.
15. The final development and the complete implementation of the veterinary information system for the management of the eradication programme should be given priority.
16. The compensation scheme should be discussed and reviewed in order to avoid overcompensation and encourage farmers to collaborate with local veterinary services.

The Working Document SANCO/6095/2009 should be taken into due consideration when designing, planning and implementing the measures foreseen by the programme. The document can be found at the following web address:

http://ec.europa.eu/food/animal/diseases/eradication/eradication_bovine_sheep_goats_brucellosis_en.pdf.

The group also wishes to thank the hosts for their generous hospitality and fruitful discussions.

Annex I

**MEETING OF THE BRUCellosIS SUB-GROUP OF
THE TASK FORCE FOR MONITORING DISEASE ERADICATION
HELD IN SKOPJE, FORMER YUGOSLAV REPUBLIC OF MACEDONIA, 14-15 MAY 2013**

PARTICIPANTS

Task Force Brucellosis Sub-Group - members

- Fabrizio DE MASSIS, Chairman, Italy
- Manuel DURAN-FERRER Spain
- Bruno GARIN-BASTUJI France
- Aristomenis KATSIOLIS Greece
- Ernst STIFTER Italy

European Commission

- Valentina PIAZZA Head of Sector: Veterinary (DG SANCO)

Country Representatives (main list)

▪ Dejan Runtevski	▪ Director – Food and Veterinary Agency - Skopje
▪ Toni Kirandzjiski	▪ Head, Animal Health Department – Food and Veterinary Agency - Skopje
▪ Greta Nikolovska	▪ Associate, Animal Health Department – Food and Veterinary Agency - Skopje
▪ Blazho Janevski	▪ Head, Veterinary Public Health Department – Food and Veterinary Agency - Skopje
▪ Svetlana Tomeska-Mickova	▪ Head, Normative and Legal Affairs Department – Food and Veterinary Agency - Skopje
▪ Ilir Veseli	▪ Head, I&R Unit – Food and Veterinary Agency - Skopje
▪ Slavco Mrenoski	▪ Head, Veterinary Institute. Faculty of Veterinary Medicine, SS. Cyril and Methodius University - Skopje
▪ Kiric Krstevski	▪ Head, Immunology and Molecular Biology Departments, Veterinary Institute, Faculty of Veterinary Medicine, SS. Cyril and Methodius University - Skopje

Annex II

MEETING OF THE BRUCELLOSIS SUB-GROUP OF
THE TASK FORCE FOR MONITORING DISEASE ERADICATION
HELD IN SKOPJE, FORMER YUGOSLAV REPUBLIC OF MACEDONIA, 14-15 MAY 2013

AGENDA

Task Force Brucellosis Sub-group visit to Former Yugoslav Republic of Macedonia
14th and 15th May 2013

AGENDA

<i>Timing</i>	<i>Item</i>	<i>Presenters/ Rapporteur</i>
DAY ONE	Skopje	
09:00	Welcome and introduction. Meeting with the CVO. Presentation of the Task Force and overview on the scope of his mission	Dejan Runtevsky, Toni Kirandzjiski
09:30	Presentation of the Food and Veterinary Agency (FVA)-structure and organization	Svetlana Tomeska- Mickova
10:00	Presentation of structure and national distribution of bovine and ovi-caprine livestock	Ilir Veseli
11:30	Bovine Brucellosis: presentation of national legislation and of the results of the brucellosis control programme implementation – Overview of the evolution, current situation and perspectives.	Toni Kirandzjiski
12:30	<i>Lunch</i>	
13:30	Sheep and Goats Brucellosis: Presentation of national legislation and of the results of the brucellosis control programme implementation – Sheep and Goats Brucellosis - Overview of the evolution, current situation and perspectives.	Toni Kirandzjiski
14:30	Presentation of the national scheme for identification and registration of animals	Ilir Veseli
15:30	Presentation of the national veterinary information system	Greta Nikolovska
16:00	Faculty of Veterinary Medicine (FVM)-Veterinary Institute (Reference laboratory for brucellosis)	Slavco Mrenoski
DAY TWO	Skopje	
09:00	On site visit of sheep farm and cattle farm in Veles	Toni Kirandzjiski
12:00	EU Task Force Brucellosis subgroup meeting	TF BRC Subgroup
13:30	<i>Lunch</i>	
14:00	Presentations of final conclusions and recommendations by the Group - Final opportunity for questions and discussions	All Speakers
15:00	<i>Closure of the meeting</i>	

Annex III

Number of holdings at the moment	Cattle	Sheep/goats
With animals	40776	9559
Without animals	24283	22800

Cattle		
Year	Total number of holdings with animals	Total number of animals
2012	40916	261073
2011	41682	267911
2010	41836	255491

Sheep/goats		
Year	Total number of holdings with animals	Total number of sheep/goats
2012	8734	765062
2011	10497	809960
2010	12684	828941

	Activity	2012	2011
Sheep/goats	Departure	196860	87941
	Arrival	62353	40915
Cattle	Departure	125908	163936
	Arrival	58375	81314

	Activity	2012	2011
Cattle	First registration	2658	2808
	Import	556	205
	Registration	72131	83935
	Total	75345	86948

All Movements	Cattle Total	2012	2011	Sheep/goats Total	2012	2011
Moved animals	1283412	152430	201708	595822	204274	95298

Holdings without movements	2012	2011
Cattle	33397	38417
Sheep/goats	28059	28788

Identification and registration	2012	2011	Average time of tagging	Average time of entering data
Cattle	75345	86948	72	10
Sheep/goats	325240	241312	258	44

Results of On-the-spot controls						
Year	Allocated on-the-spot controls	Carried out on-the-spot controls	Non-compliant holdings	% Non-compliant holdings	Granted decision	Penalties
2012	4191	3390	1090	0.32	1257	136
2011	3535	3111	1565	0.5	1548	204

Bovine breed	%
Buffalo	0.0
Busha	8.7
Other.or mixture of breeds	41.6
Montafon	3.5
Oberintal	0.2
Simmental	5.1
Meat breed	0.0
Hereford	0.0
Holstein Friesian	40.8
Total	100
Sheep breed	%
Awassi	0.3
Württemberg	9.8
Other	22.1
East friesian	0.0
Karakachan breed	0.1
mixed Awassi	4.0
mixed Württemberg	16.7
mixed East friesian	0.0
Ovchepole breed	27.1
Blackhead Plevan	0.0
Sharplanina breed	19.9
Total	100
Goat breed	%
Alpine	4.8
Autochtone breed	48.2
Other	27.9

Mixed alpine	7.4
Mixed Sannen	3.0
Sanne	8.6
Total	100

	Number of holdings	Number of small ruminants
from 1 to 10 animals	3271	10897
from 11 to 100 animals	3434	159154
from 101 to 300 animals	2161	376208
from 301 and more	471	239700

	Number of holdings	Number of bovines
1 to 10 animals	35983	118118
11 to 50 animals	4403	90445
51 and more animals	529	52510

Cattle

Municipalities	Number of holdings	Number of animals
AERODROM	46	161
ARACINOVO	412	2847
BEROVO	449	2241
BITOLA	1209	15794
BOGDANCI	141	1238
BOGOVINJE	910	3790

BOSILOVO	946	4794
BRVENICA	825	3412
BUTEL	368	2792
VALANDOVO	353	2556
VASILEVO	278	3445
VEVCANI	56	141
VELES	568	3691
VINICA	219	1929
VRANESNICA	94	358
VRAPCISTE	690	3329
GAZI BABA	518	2744
GEVGELIJA	213	856
GOSTIVAR	1889	7667
GRADSKO	97	876
DEBAR	622	2512
DEBARCA	390	1130
DELCEVO	575	3872
DEMIR KAPIJA	115	2239
DEMIR HISAR	324	1713
DOJРАН	186	1017
DOLNENI	1802	8095
DRUGOVO	144	518
ЃORCE PETROV	92	366
ŽELINO	1119	5006
ZAJAS	550	2066
ZELENIKOVO	123	1645
ZRNOVCI	137	563
ILINDEN	270	1441
JEGUNOVCE	692	3162
KAVADARCI	67	1444
KARBINCI	226	4588

KARPOS	54	257
KISELA VODA	41	181
KICEVO	218	4586
KONCE	324	2144
KOCANI	264	2427
KRATOVO	337	3051
KRIVA PALANKA	582	2866
KRIVOGASTANI	646	2698
KRUSEVO	528	1604
KUMANOVO	1854	11963
LIPKOVO	1794	8901
LOZOVO	55	757
MAVROVO I ROSTUSA	489	1594
MAKEDONSKA KAMENICA	314	1756
MAKEDONSKI BROD	346	1224
MOGILA	555	5458
NEGOTINO	77	1174
NOVACI	234	5508
NOVO SELO	534	3625
OSLOMEJ	506	2659
OHRID	271	1071
PETROVEC	387	2728
PEHCEVO	319	1843
PLASNICA	309	929
PRILEP	1016	9742
PROBISTIP	270	2268
RADOVIS	617	4590
RANKOVCE	339	2151
RESEN	255	781
ROSOMAN	22	234

SARAJ	1028	4832
SVETI NIKOLE	306	3263
SOPISTE	246	1857
STARO NAGORICANE	674	5193
STRUGA	1523	5587
STRUMICA	788	3687
STUDENICANI	550	3028
TEARCE	824	3952
TETOVO	1474	7132
CENTAR	9	180
CENTAR ŽUPA	309	1259
CAIR	6	33
CASKA	542	4389
CESINOVO-OBLESEVO	440	1645
CUCER-SANDEVO	648	15784
STIP	184	2253
SUTO ORIZARI	45	191

Grand Total	40868	261073
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Row Labels	Bivoli	Braunvieh	Busa	other or mixed bredd	Montafon	Oberintal	Simental	meet breed	Hereford	Holstein frissian	Grand Total
AERODROM			2	35	4		10			110	161
ARACINOVO			314	1940	39	12	183		1	358	2847
BEROVO			14	437	951		5			834	2241
BITOLA		126	241	661	220	7	188		1	14350	15794
BOGDANCI			20	64	181		43			930	1238
BOGOVINJE			406	851	48	16	162			2307	3790
BOSILOVO	16		195	2321	28		10			2224	4794
BRVENICA			413	450	20	1	84			2444	3412
BUTEL			340	1084	39	3	170	1		1155	2792
VALANDOVO			496	1537	75	4	12			432	2556
VASILEVO			69	2908	16	2	1	1		448	3445
VEVCANI				9	1	3	10			118	141
VELES			473	2112	122	2	88		83	811	3691
VINICA	1		77	1620	47	3	30		16	135	1929
VRANESNICA			12	90	19		55			182	358
VRAPCISTE			321	994	78	4	166		1	1765	3329
GAZI BABA			168	586	45	22	227			1696	2744
GEVGELIJA			78	192	154		70			362	856
GOSTIVAR	4		468	2369	374	24	774	2	2	3650	7667
GRADSKO			148	494	9		19			206	876
DEBAR			570	563	27	2	46			1304	2512
DEBARCA			10	714	15		11			380	1130
DELCEVO			128	3368	33	1	24	1	1	316	3872
DEMIR KAPIJA			110	2093			9	1		26	2239
DEMIR HISAR			9	754	20	18	54	3		855	1713
DOJRAN			188	378	149		41			261	1017
DOLNENI	10	11	124	4321	469	5	176	1		2978	8095

DRUGOVO			21	168	14	3	14			298	518
ЃORCE PETROV			8	232	1	1	19			105	366
ŽELINO			407	2103	92	15	99			2290	5006
ZAJAS		1	99	782	272	4	153			755	2066
ZELENIKOVO			168	1370			11			96	1645
ZRNOVCI			40	208	19		5			291	563
ILINDEN			73	220	19	35	85			1009	1441
JEGUNOVCE			93	349	95	7	64			2554	3162
KAVADARCI			3	1265	11	9	10	1	93	52	1444
KARBINCI			456	3192	84	4	57			795	4588
KARPOS			1	77	4		7			168	257
KISELA VODA				34	4					143	181
KICEVO			292	1584	519	17	212	3		1959	4586
KONCE			19	1632	132	13	28			320	2144
KOCANI	8	1	283	1613	31		33	1		457	2427
KRATOVO			206	2632	13		117			83	3051
KRIVA PALANKA			586	1443	39		413			385	2866
KRIVOGASTANI			3	824	215		37			1619	2698
KRUSEVO	10	7	44	875	130		24			514	1604
KUMANOVO	1	16	243	5232	464	3	2215			3789	11963
LIPKOVO	1		384	5354	253	4	1159			1746	8901
LOZOVO			8	617	1		49			82	757
MAVROVO I ROSTUSA	1		479	946	7	13	16			132	1594
MAKEDONSKA KAMENICA			280	1453	1		4			18	1756
MAKEDONSKI BROT			45	1051	5	6	9			108	1224
MOGILA		53	9	381	141	3	48			4823	5458
NEGOTINO	1			810	18		2			343	1174
NOVACI			807	1583	114	15	67			2922	5508
NOVO SELO			33	1586	12		5			1989	3625
OSLOMEJ	4		97	1178	178		114	6		1082	2659

OHRID			100	480	1					490	1071
PETROVEC		28	97	1069	22		40			1472	2728
PEHCEVO			1	734	588	8	3	4		505	1843
PLASNICA	1		17	425	37	11	27	1		410	929
PRILEP	1		358	4322	400	3	103			4555	9742
PROBISTIP			207	1599	69		93			300	2268
RADOVIS	2		275	2881	346	24	81			981	4590
RANKOVCE			379	941	111		363	1		356	2151
RESEN			7	163	110	71	15			415	781
ROSOMAN			3	164	4		11			52	234
SARAJ	2		346	3212	58	1	110			1103	4832
SVETI NIKOLE		159	19	1691	55		565			774	3263
SOPISTE	3		336	1337	5	7	33			136	1857
STARO NAGORICANE			202	1983	107	1	2053			847	5193
STRUGA		35	59	663	109	21	343			4357	5587
STRUMICA			77	1791	26		9	1		1783	3687
STUDENICANI			521	2108	4	1	40			354	3028
TEARCE			59	958	51	6	146			2732	3952
TETOVO			1012	1979	99	7	147			3888	7132
CENTAR			6	76	5		36			57	180
CENTAR ŽUPA			274	310	10	26	35			604	1259
CAIR			1	9						23	33
CASKA			1681	2393	39	3	123	1	2	147	4389
CESINOVO-OBLESEVO			17	782	10		12			824	1645
CUCER-SANDEVO	3		3551	6496	576	19	924	5	12	4198	15784
STIP	9		150	1367	62	3	62			600	2253
SUTO ORIZARI			27	48	2		13			101	191

Breed	Bivoli	Braunvieh	Busa	other or mixed bredd	Montafon	Oberintal	Simental	meet breed	Hereford	Holstein frissian	Grand Total
Grand Total	78	437	20363	113720	8977	493	13131	34	212	103628	261073

Municipalities	Number of holdings	Goats	Sheep	Total
AERODROM	2	5	63	68
ARACHINOVO	31	144	4176	4320
BEROVO	403	1723	18709	20432
BITOLA	147	831	14022	14853
BOGDANCI	13	673	7072	7745
BOGOVINJE	49	136	10108	10244
BOSILOVO	87	482	3194	3676
BRVENICA	24	292	4009	4301
BUTEL	30	437	4161	4598
VALANDOVO	47	1880	4271	6151
VASILEVO	100	1111	5358	6469
VEVCHANI	3	0	407	407
VELES	95	767	14982	15749
VINICA	737	2981	10527	13508
VRANESNICA	11	109	1173	1282
VRAPCHISTE	108	672	17487	18159
GAZI BABA	47	335	3464	3799
GEVGELIJA	90	860	6321	7181
GOSTIVAR	116	779	15893	16672
GRADSKO	34	309	9722	10031
DEBAR	68	287	11993	12280
DEBARCA	154	1251	5504	6755
DELCHEVO	218	1439	6807	8246
DEMIR KAPIJA	34	903	1820	2723
DEMIR HISAR	51	525	3790	4315
DOJRAN	13	384	927	1311
DOLNENI	102	369	15491	15860
DRUGOVO	48	863	4613	5476

GJORCHE PETROV	14	260	1255	1515
ŽELINO	27	463	3155	3618
ZAJAS	88	220	11197	11417
ZELENIKOVO	9	117	598	715
ZRNOVCI	82	482	901	1383
ILINDEN	95	302	833	1135
JEGUNOVCE	57	501	2587	3088
KAVADARCI	108	1358	7237	8595
KARBINCI	105	2301	13796	16097
KARPOS	1	2	0	2
KISELA VODA	2	28	35	63
KICHEVO	26	191	1606	1797
KONCHE	48	790	4220	5010
KOCHANI	334	1656	4789	6445
KRATOVO	373	2781	9165	11946
KRIVA PALANKA	463	2366	3244	5610
KRIVOGASTANI	33	5	2808	2813
KRUSEVO	60	241	7058	7299
KUMANOVO	196	1551	18558	20109
LIPKOVO	70	873	12566	13439
LOZOVO	130	430	5422	5852
MAVROVO I ROSTUSA	57	595	23551	24146
MAKEDONSKA KAMENICA	333	1545	3319	4864
MAKEDONSKI BROD	44	736	5988	6724
MOGILA	103	302	12701	13003
NEGOTINO	122	856	3858	4714
NOVACI	104	405	20788	21193
NOVO SELO	300	2005	9246	11251
OSLOMEJ	50	158	7655	7813
OHRID	109	760	5977	6737

PETROVEC	38	622	3716	4338
PEHCHEVO	135	200	9386	9586
PLASNICA	34	345	4891	5236
PRILEP	255	1991	45656	47647
PROBISTIP	269	1423	13774	15197
RADOVIS	177	1713	23019	24732
RANKOVCE	135	884	3867	4751
RESEN	47	270	4188	4458
ROSOMAN	33	236	4565	4801
SARAJ	54	249	6300	6549
SVETI NIKOLE	368	879	26089	26968
SOPISTE	50	360	4407	4767
STARO NAGORICHANE	270	845	22068	22913
STRUGA	163	729	16998	17727
STRUMICA	125	1234	2845	4079
STUDENICHANI	40	536	4500	5036
TEARCE	72	299	8242	8541
TETOVO	83	475	14147	14622
CENTAR ŽUPA	89	275	22728	23003
CHASKA	100	850	24210	25060
CHESINOVO- OBLESEVO	180	444	7623	8067
CHUCHER-SANDEVO	59	90	10123	10213
STIP	153	1423	30999	32422
SUTO ORIZARI	3	72	170	242

Grand Total	9337	61271	724688	785959
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