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REPORT ON THE

**TASK FORCE MEETING
OF THE
RABIES SUBGROUP**

KLAGENFURT – AUSTRIA , 21-22 SEPTEMBER 2004

REPORT OF THE
RABIES SUBGROUP OF THE TASK FORCE
MEETING HELD IN KLAGENFURT – AUSTRIA , ON 21-22 SEPTEMBER 2004

Agenda: The meeting was held on 2 days (see Annex 1).

Participants: see Annex 2.

Chairman: Dr. Vilmos Pálfi

1. Introduction

Dr. Ursula Jessenitschnig, deputy CVO of Carinthia, officially opened the meeting.

The Commission explained the background of the task force for monitoring disease eradication in Member States and the creation of the new rabies subgroup. The objective of the task force is to improve animal disease eradication programmes and their cost-benefit-ratio. The subgroups provide technical expertise for the Member States and the Commission. The rabies eradication programmes are to be considered of the highest priority among the EC co-financed eradication programmes.

The Chairman introduces the experts of the subgroup and requests them to give a concise overview of the rabies situation in the represented Member States.

In Hungary, oral immunization of foxes against rabies started in 1992. In the first four years only limited areas were vaccinated due to financial difficulties. Between 1996 and 2000 Transdanubia (38.000 km²) was covered by the programme. As in 2000 no rabies case was detected in the vaccinated territory, the territory between river Danube and Tisza (32.000 km²) was vaccinated from 2001 to 2003. This year Hungary started to vaccinate the whole territory of the country.

Lithuania intends to start oral vaccination programme in autumn of 2004 in the framework of the PHARE project „Strengthening Control of infectious Animal Diseases in Lithuania”. The vaccination campaigns should be organized in the 3 Baltic countries, Estonia, Latvia and Lithuania, as well as in Poland and Kaliningrad region.

Slovakia had started the vaccination in 1994, but it was stopped in 1997 for financial reasons. The programme started again in 2000. Due to the bad efficacy of the vaccine used in the first three years, the number of rabies cases did not decrease. The change in 2003 to the SAD Bern vaccine strain led to satisfactory results and a decrease of rabies cases. The problem during the campaigns is the low amount of foxes tested for the efficacy of the vaccination. Instead of the planned 8 foxes per 100 km² only 4-5 foxes per 100 km² were tested.

The oral vaccination in the Czech Republic started in 1989. The last rabies case was detected in April 2002. In total 3 rabid red foxes were found along the Polish border during 2002. The country was declared free of rabies in 2004 (see OIE Disease Information Vol.17 – No. 30 of 23 July 2004). The vaccination campaign will be continued in a buffer zone along the Polish and Slovakian border.

2. Presentations and discussion

Dr. Ursula Jessenitschnig gave a historical review on the rabies situation in Austria. Details were presented and attention was given to the process modelling in veterinary epidemiology for rabies cases and vaccination areas of wildlife. The discussion emphasized the importance of sound data collection and geo-referencing of rabies cases in wildlife. Information of neighbouring countries is considered to be very important. As regards vaccination programmes, a 70% coverage of the fox population is at least required, although this needs further studying.

Dr. Franz Rubel and Andrea Höflechner presented an overview on the documentation of rabies in Austria between 1945 and 2004. No overall documentation and no digital data sets on rabies exist before 2000 in Austria. Six papers were published with detailed information on the rabies epidemics. Historical rabies cases and vaccination areas have been digitized. As a result of this activity examples of visualized number of rabies cases were presented between 1945 and 2004 and on rabies cases and vaccination areas since 1992. Visualized geo-referenced rabies data are available for the period between 1945 and 2004 with details per year and for districts. Furthermore for 1989 until 2004 monthly and points resolutions are available.

Data were shown on the exponential decay in occurrence of rabies cases due to the start of vaccination of foxes during the period between 1991 and 2002. The population density of red foxes increased as a consequence of the vaccination. In the discussion it was stressed that rabies should be considered as endemic if even one rabies case in a rabies free region is found. Every Member State should map the rabies cases to follow the epidemic and the impact of vaccination on the rabies incidence. The establishment of a Central Rabies Database and the use of mapping software was advised.

Dr. Andrea Höflechner gave a review on the rabies programme in Austria. In the first part of this talk the organization of rabies programme, the rabies cases, the rabies eradication and surveillance and the end of the eradication were presented.

The rabies eradication programme has been organized by the Ministry since 1991. Baits are distributed in two campaigns per year, in spring and autumn. Preparatory meetings are held in spring with all bodies involved in the programme. Call for tenders are launched every 2 years. The criteria for the choice of the baits are registration and price. Since 1998 the Rabifox vaccine has been used in Austria. Since autumn 1991 till spring 2004 29 campaigns were carried out including two emergency vaccinations during spring 2002 and 2004 with a higher density of baits. The distribution of the baits since spring 1997 has been done mostly by aircraft. In the discussion the necessity of double vaccination with an interval of 4 – 6 weeks to immunize the young foxes was mentioned.

In 1991 2.469 rabies cases were diagnosed in Austria while in 1997 only 8 cases were found proving the efficacy of the oral vaccination of foxes. In 2002 reinfection was detected in Carinthia, in 2003 a rabies positive horse was found in Burgenland and in 2004 a rabies positive fox was diagnosed again in Carinthia (a case report can be found in “Rabies Bulletin Europe, Volume 28, No. 2, Quarter 2, 2004).

To control the rabies programme the tetracycline marker, the virus titration of baits and the documentation of flight routes are applied.

During the eradication of rabies the following definition of areas has been set up:

1. **Rabies infected area** where rabies cases were found in the last two years.
2. **High risk area** near the border to an infected neighbouring country or near to an infected area in Austria
3. **Low risk area** where after finishing the oral vaccination of foxes no rabies was detected.
4. **Rabies free area** where after the last vaccination there was no rabies case within four years.

To control the bait uptake at least 8 foxes per 100 km² are tested in rabies infected, high risk and low risk areas. In rabies free areas 4 healthy adult foxes per 100 km² and foxes found dead or sick are tested.

The disease free status was given to areas where four years after the last vaccination campaign no rabies case was registered and considering the rabies situation in the neighbouring countries.

In the second part of the talk the collaboration and cooperation with the neighbouring countries were reviewed. It was stressed that the rabies free status of a given area highly depends on the situation in the neighbouring countries. Before enlargement of the EC information was exchanged with the neighbouring countries on vaccination and rabies cases. Besides, personal contacts helped this programme. There was no legal basis for Austria to subsidize the eradication programme in Third Countries.

At present the coordination of the campaigns and the rapid information on rabies cases are practiced. Scientific cooperation is done on epidemiology and documentation of rabies. Between the Member States of the EC an increasing collaboration on rabies can be seen.

The rabies eradication programme in Carinthia was presented by Dr. Marie-Christin Rossmann. The first rabies case was detected in 1975 in a badger found dead. The infection was originating from Germany, and the infection spread through Vorarlberg and Tirol to Carinthia. An explosive spreading of the infection was observed, and in 1978 1607 rabies cases were diagnosed. The last case appeared in 1992, but in 1994 a new epidemic started. The suspected source of infection was Slovenia, where that year 500 rabies cases were detected. In 1994 27.000 baits were distributed in the Southern part of Carinthia, while in 1995 and 1996 ca. 60.000. In 1997 only 4000 baits were laid along the Slovenian border. The last epidemic started in January 2002. The possible immigration took place from Slovenia. The social behaviour of the animals in spring time favoured the spread of the disease. In 2002 24 cases of rabies were diagnosed. In 2003 no rabies was found, while in 2004 1 positive fox puppy was detected.

In May 2004 60.800 baits were distributed, and in June a further 49.400. The next bait laying is planned for October. During the last two years 11 bait laying campaigns were carried out in Southern Carinthia. In the meanwhile upper Carinthia has been declared free of rabies.

Dr Thomas Selhorst gave a lecture on the possible risks during and at the end of oral vaccination of foxes against rabies. The risks causing failures of oral vaccination were considered in this presentation.

Risks during oral vaccination

During the eradication phase we face the risk of being inefficient. Efficiency can be measured if we scatter-plot rabies cases (log transformed) against cumulated costs per area (area of a federal state for example). In most cases this will be a linear relation, and then the slope of the

regression line indicates efficiency. A large slope stands for the high efficiency and vice versa.

If we look at the different strategies of oral vaccination of foxes conducted in Germany, we find differences in efficiency. The strategy of baiting a rabies infected area consecutively over a long period is significantly more efficient than performing patchwork vaccinations driven by the actual rabies situation.

It can be shown, that a change in the strategy from a small scale and short term strategy to a long term and large scale strategy immediately improves the efficiency.

Risks during the final phase of oral vaccination

The risks during the final phase of oral vaccination include the risk of misinterpretation of the rabies – fox – system and the carelessness and the inconsequence in designing and conducting oral vaccination of foxes.

The rabies – fox- system is often misunderstood in terms of its dynamics. What has to be considered is that rabies is a mortality factor. Rabies dramatically reduces population density of foxes. Beside the density effect there is always an effect upon the population structure. A fox population at low densities is expected to show an age structure with numerous juveniles and small numbers of adults. A fox population density equal to the carrying capacity is expected to result in numerous adults and only few juveniles. Because it is difficult to immunize juvenile foxes the vaccination coverage depends on the population structure of the foxes.

The population density in a given area also determines the infection dynamics. Because the same number of infected animals living either in close contact (at high densities) or scattered (at low densities) influences the spread of the disease. Therefore it is probably necessary to improve vaccination coverage of foxes in the final phase of oral vaccination by adaptations of the flight line distances.

Risks after the last rabies case

After the last case of a rabid animal there always exists a risk of rabies resurgence. This effect might occur in case of low level persistence of rabies despite vaccination. Low level persistence stands for the possibility that rabies persists in a population at very low levels. If this is the case, spots of rabies cases occur as limited episodes showing no regular pattern. When vaccination stops, rabies incidence will increase again. Simulation studies indicated that the time needed to infect enough foxes to increase the rabies incidence to detectable levels takes about two years. This also means that one has to wait another two years after vaccination stops to securely exclude the possibility of low level persistence of rabies. Generally it can be stated that rabies takes two years after introduction to reach incidence levels which can be detected by the usual surveillance systems. The area to be treated in case of rabies re-emergence is also determined by the area that can be infected by few rabid animals within two years time.

In summary it is stated that:

1. potential risks with oral vaccination are identified,
2. adequate risk diminishing measures are proposed.

Risk diminishing factors are:

- During oral vaccination
 - ✓ Long term large scale vaccination
- In the final phase of oral vaccination
 - ✓ Adaptation of flight line distances
- After the last rabies case
 - ✓ Consequent surveillance for two years.

Diagnostic work on Rabies carried out in the Austrian Agency of Health and Food Safety (AGES, Mödling) was presented by dr. Eveline Wodak and dr. Elisabeth Vanek.

In the Institute for veterinary Disease Control rabies investigations take place in the Department of Virology and in the Department for Pathology.

In the Department of Virology the following tests are used in Rabies Diagnostic investigations:

1. Cell culture test of brain tissue and other organic material. Neuroblastoma cell line is used which is very easy to handle and is sensitive to the street isolates. After 3 days incubation fluorescence antibody test (FAT) is applied to confirm the presence of rabies virus antigen.
2. Cell culture test for batch control of inactivated rabies vaccines for safety. BHK21 cells are inoculated and after 24 hours incubation 5 times passaged, followed by FAT test.
3. Tetracycline marker investigations in fox jaw bone to control the uptake of baits. Statistical data show an increase in bait uptake in four territories of the country from 74% in 2001 to 84 percent in 2003.
4. Fluorescent antibody virus neutralisation (FAVN) test is used for serological investigations of dog and cats as prescribed in the pet travel scheme.
5. Serological investigation of fox sera to measure the antibody response in vaccinated animals. Due to the difficulties arisen from the bad quality of samples in the FAVN test, the ELISA method will be applied in the near future.
6. RT-PCR method with primers for the nucleoprotein gene of rabies virus is used routinely followed by sequencing the PCR product. This method enables the differentiation between field and vaccine strains.

The FAT test has been used since 1966. In total 575.400 samples have been tested between 1966 and 2004. At present 2 pathologists and 5 technicians work in the rabies group. In the Institute 5 veterinarians are trained for FAT diagnosis. Immunohistochemistry is used to examine annually 200 – 250 samples. Patterns of routine FAT investigations were presented of samples from animals that have bitten humans, clinical suspect cases of rabies and samples of different species.

Conclusions

The oral vaccination programme in Austria has proven to be very effective and successful. The surveillance system and the follow up investigations as established in Austria are of high level. The laboratory expertise for the control of the monitoring programme is of a high quality as well and meets international standards. Nevertheless a sero-surveillance to evaluate the immunity of vaccinated foxes was not implemented

Recommendations

1. Austria could decide to abandon the oral vaccination of foxes in some regions of the country. However Austria should stay prepared to organize immediately an emergency vaccination in case of re-emergence of a rabies outbreak.
2. Depending on the epidemiological situation in the neighboring countries the vaccination has to be continued along the borders following the general recommendations of the scientific report on oral immunization of foxes against rabies of the SCAHAW.
3. As for the future rabies surveillance in free regions, more emphasis should be put to indicator animals such as found dead, road kills and animals showing abnormal behavior instead of the system in place until now. The issue however is still under discussion in advisory bodies.
4. Evaluation of oral vaccination programme of foxes should include sero-surveillance of immunity in foxes.
5. In order to ensure the success of rabies eradication and to secure the rabies free status the mutual exchange of relevant information between Austria and the neighboring countries has to be enhanced at a central and a local level.

Annex 1

Tagesordnung

Dienstag, 21. September/Tuesday, 21st September

9:00 – 10:00	registration /Registrierung
10:00 – 10:20	Official opening/Grußworte District President/Landesrates Dr. Josef Martinz Deputy Veterinary Director/Stellvertretende Landesveterinärdirektorin Dr. Ursula Jessenitschnig
10:20 – 10:30	Task force subgroup Rabies; introduction, tasks and targets/ Task force subgroup Rabies; Vorstellung, Aufgaben und Ziele Chairman of the subgroup
10:30 – 10:50	coffee break / Kaffeepause
10:50 – 11:20	Documentation of Rabies in Austria/Dokumentation der Tollwut in Österreich Univ.-Prof. Dr. Franz Rubel, Veterinärmedizinische Universität Wien
11:20 – 11:50	Rabies eradication programme in Austria – review, co- operation with neighbouring countries/ Rückblick über das Tollwutbekämpfungsprogramm in Österreich; Zusammenarbeit mit Nachbarländern Dr. Andrea Höflechner, Bundesministerium für Gesundheit und Frauen
11:50 – 12:15	Discussion/Diskussion
12:15 – 13:30	Lunch/Mittagspause
13:30 – 14:00	Rabies eradication programme in Carinthia/Das Tollwutbekämpfungsprogramm in Kärnten Dr. Marie-Christin Rossmann, Amt der Kärntner Landesregierung
14:00 – 14:30	Potential risks at the end of oral vaccination/Risiken am Ende der Tollwut-Impfung Dr. Thomas Selhorst, Bundesforschungsanstalt für Virusseuchenbekämpfung Wusterhausen
14:30 – 15:00	Discussion/Diskussion
15:00 – 15:30	Coffee break/Kaffeepause
15:30 – 16:00	Questions of the members of the task force subgroup/Fragen der Mitglieder der Task force subgroup

Evening programme/Abendprogramm

Visit of „Minimundus“ and dinner/Besuch des „Minimundus“ und Abendessen

Wednesday, 22nd September/Mittwoch, 22. September 2004

9:00 – 9:20	Rabies investigation in the Austrian Agency of Health and Food Safety/Tollwutuntersuchungen in der AGES Dr. Elisabeth Vanek/Dr. Eveline Wodak, AGES Mödling
9:20 – 10:20	Meeting of the task force subgroup Rabies/Sitzung der task force subgroup Rabies
10:20 – 10:50	Coffee break / Kaffeepause
10:50 – 11:30	Recommendations of the group and final discussion/Empfehlungen der Gruppe Chairman und Schlussdiskussion
ca. 12:00	end of the meeting/Ende der Veranstaltung

Annex 2