RABIES BULLETIN EUROPE

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Contents

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1. Introduction

This BULLETIN describes the reported rabies cases in Europe for the **Third Quarter 1990**, subsequently referred to as ***"This Quarter"***.

In SECTION 2 a summary of the rabies situation in general is given.

SECTION 3 reflects the situation for individual countries.

In the Miscellaneous SECTION article 4.1 informs on an **International symposium in France in 1991**. Under 4.2 a review is given on the **rabies situation of the European part of the Soviet Union** in 1989. Under 4.3 an annual reporting is continued describing areas of **oral vaccination of foxes against rabies in Europe from 1978 to 1990.** This text is supplemented by a map in the ANNEX. The recommendations of a **WHO Seminar on Wildlife Rabies** of July 1990 in Geneva, part one are presented under 4.4. A part two, with recommendations on vaccines and vaccination will be continued in another issue of this BULLETIN.

The rabies case data are tabulated for the third quarter 1990 in SECTION 5.

SECTION 6 lists the official contributors to the BULLETIN.

The geographical distribution of rabies cases in Europe for the third quarter 1990 is shown on maps of Europe and Turkey in the ANNEX.

2. Summary of Rabies in Europe

Third Quarter 1990

During ***"This Quarter"***, 4347 rabies cases were reported in Europe. Of these were 3193 in wild animals (73.5% of total), 1146 in domestic animals and 8 in humans.

Of the cases in wild animals 2616 were foxes, 3 wolves, 30 raccoon dogs, 50 badgers, 112 stone martens, 16 pine martens, 6 polecats, 1 brown bear, 1 raccoon, 69 roe deer, 4 red deer, 2 fallow deer, 2 wild boars, 1 chamois, 25 bats, 1 squirrel, 1 black rat, 1 house mouse and 252 other wild animals of which the species were unknown or not determined. Of the 1146 domestic animals 210 were dogs (of which 81 - 38.6% of all dogs - were reported from Turkey, a country with dog-mediated rabies), 247 cats, 18 other domesticated carnivores, 21 horses, 2 donkeys, 1 pig, 479 cattle, 159 sheep, 7 goats, 1 other domesticated herbivore and 1 domesticated rabbit.

These data are summarized in TABLES 1 and 3, SECTION 5.

TABLE 2 summarizes the Quarters 1 to 3 of the rabies data in Europe.

In comparison with the second quarter 1990 (4283 cases - corrected figure) Europe experiences a slight increase in rabies cases. The distribution of cases resembles grossly the one during the second quarter 1990.

Rabies-free countries in Europe participating in the surveillance were: Bulgaria, Greece, Iceland, Ireland, the mainland of Norway, Portugal, Sweden and the United Kingdom of Britain and Northern Ireland.

There were no cases reported from Denmark, Finland, Italy, Svalbard of Norway and the mainland of Spain, but their last indiginously acquired case was recorded less than two years ago.

Bat rabies has its peak usually in the third quarter, a time span of great activity in the bat populations with raising of young, mating and in few species migration. There were reports of bat rabies cases during ***"This Quarter"*** from the Federal Republic of Germany (9 cases), the Netherlands (15 cases) and in Poland (1 case).

Eight (8) human cases were reported from the European part of the Soviet Union.

3. Rabies in Individual Countries

3.1 Austria AUT

by Helmut Schnabl

During *"This Quarter"*, 406 cases of animal rabies were registered of 6298 samples received. In comparison with the previous quarter (572 animal cases) there was a decrease by 29%.
Of 395 rabid wild animals (97% of total) 312 were foxes, 20 badgers, 40 stone martens, 1 polecat, 20 roe deer, 1 red deer and 1 chamois. Of 11 rabid domestic animals, 2 were dogs, 1 cat, 2 cattle and 6 sheep.

The distribution of rabies cases by Bundesländer (federal provinces) and Bezirke (districts) was as follows:

Burgenland: 46 cases (11% of total); rabies in all districts.

Kärnten: 4 cases (1%); infected were the Bezirke St.Veit/Glan and Völkermarkt.

Niederösterreich: 155 cases (38%); Bezirke infected were Gänserndorf, Gmünd, Hollabrunn, Horn, Krems, Lilienfeld, Melk, Neunkirchen, St.Pölten, Scheibbs, Tulln, Waidhofen/Thaya, Wiener Neustadt and Zwettl.

Oberösterreich: 57 cases(14%); rabies in the Bezirke Braunau-/Inn, Freistadt, Gmunden, Kirchdorf/Krems, Perg,Ried /Innkreis and Vöcklabruck.

Salzburg: 1 case in Salzburg-Umgebung.

Steiermark: 143 cases (35%); rabies in Graz-Stadt, Bruck-/Mur,Deutschlandsberg,Feldbach, Fürstenfeld, Graz-Umgebung, Hartberg, Leibnitz, Leoben, Liezen,Mürzzuschlag, Radkersburg and Weiz.

There were three federal provinces free of rabies: Tirol, Vorarlberg and Wien.

3.2 Belgium BEL

by J. Tambeur

11 rabies cases were registered during *"This Quarter"* in 10 localities of the provinces LIEGE, LUXEMBOURG and NAMUR. Of these were 6 cases in domestic animals (5 cattle and 1 horse) and 5 in wild animals (4 foxes and 1 polecat).

The decrease of cases continued since December 1989, especially in the region of South-Luxembourg (2200 km²) which was treated during autumn 1989 and spring 1990 respectively with recombinant rabies vaccine. No rabies cases were diagnosed in foxes since April 1990, and none in domestic animals since June 1990.

There was a decrease of cases by 54.2% compared to the previous quarter and a decrease by 85.3% compared to the same quarter 1989.

During the month of October 1990, an oral vaccination campaign will be organized with the recombinant rabies vaccine. The entire infected area of the country (10700 km²) will be treated making use of an aircraft flying at low altitude for the distribution of the vaccine baits.

3.3 Bulgaria BUL

The country remained rabies-free.

3.4 Czechoslovakia CZE

by Oldrich Matouch

During *"This Quarter"*, there were 305 cases of rabies registered on the territory of Czechoslovakia. Of these 275 (90.2%) occurred in wild animals and 30 (9.8%) in domestic animals.Of the total number of cases (305) 238 (i.e. 78%) were diagnosed in the Czech Republic (CR) and 67 (i.e. 22%) in the Slovak Republic (SR).

During the said period a decrease of the incidence of rabies was noticed as compared to both, the same period of last year (by 9.2%) and the second quarter 1990 (by 11.6%). In wild animals rabies was diagnosed in 261 foxes (CR-209, SR-52), 1 badger (CR), 11 martens (CR -7, SR-4) and 2 roe deer (CR). In domestic animals the disease was confirmed in 11 dogs (CR-5, SR-6), 17 cats (CR-12, SR-5), 1 cow and 1 sheep (CR).
The highest number of positive findings was in the region of North Bohemia - 94 (3rd quarter 1989 [3/89]-59) followed by West Bohemia-33 (3/89 -85), East Bohemia-29 (3/89-31) and North Moravia-26 (3/89-33).

Of the districts the incidence is highest in Usti n.Labem (20), Jablonec n.N. and Bruntal (14 each), Decin (13) and Ceska Lipa (12).

At present rabies on the Cze-

choslovak territory is documented in 303 foci of 78 districts (Czech Republic 241-55 districts, Slovak Republic 62-23 districts).
There was **no case** of rabies reported **in man.**

Oral immunization
The third campaign of oral vaccination was performed in spring 1990. Three districts - Klatovy, Domazlice, Tachovwere treated the third time and 10 districts of West and South Bohemia for the first time. The vaccination zone covered an area of 14.520 km² and 217.800 baits were distributed.
A further vaccination campaign of the same extent is planned for autumn 1990.

3.5 Denmark DEN

by Eric Stougaard

No case of bat rabies was reported during ***"This Quarter"***. The country remained **rabies-free** in terrestrial animals.

3.6 Germany, DDR Democratic Republic

by Klaus Stöhr

The incidence of rabies continued to be high in spite of a slight downward tendency of rabies cases.
During ***"This Quarter"***, 933 rabies cases were registered in animals (third quarter 1989= 1018 cases). Of these were 642 foxes, 31 stone martens, 9 badgers, 1 polecat, 21 roe deer, 1 fallow deer, 1 wild boar, 24 dogs, 48 cats, 62 cattle, 88 sheep, 4 horses and 1 domestic rabbit.

A high frequency of cases was noticed in the southern districts (Bezirke) of Chemnitz, Leipzig, Magdeburg, Erfurt and also in Potsdam (here especially in the vicinity of Berlin). Compared to the third quarter 1989 there was a substantial reduction of cases in the districts of Suhl and Dresden.

Though the case freqencies in the north (district of Rostock) and east (districts of Brandenburg and Frankfurt/Oder) of the country were lesser as compared to the same period of last year, a worsening of the epidemic in these parts has to be anticipated. That can be seen from the high percentage of foxes being diagnosed rabid (partly more than 90%) in "This Quarter". Anyway, an unfavourable development of the rabies situation has to be expected in general for 1991 as the intensity of hunting has dropped -and thus fox populations are not controlled accordingly- because bounties are not paid anymore. Hopefully, that negative aspect for the rabies control can be counterbalanced by the use of oral immunization of foxes against rabies.

In September 1990 the third vaccination campaign of oral immunization of foxes was started during autumn.
1.007.800 vaccine baits were distributed altogether (own production including 144.800 Tübingen vaccine baits) in an area of 56.800 km² . On more than 70% of the area single engine aircraft was used for the distribution of vaccine baits. 17-20 vaccine baits were used per one km² . 5% of the total area was vaccinated the third time and 18% for the second time.

Note: The political unification of DEU and DDR by October 1990 requires that future reporting will be based on **11 old and 5 new federal states of Germany**, the latter 5 representing the former DDR. With the fourth quarter 1990 the reporting will therefore combine the 11 old and 5 new federal states of Germany!

3.7 Germany, DEU Federal Republic

by Winfried W. Müller

A total of 420 rabies cases was reported during ***"This Quarter"***, one case more than during the previous quarter, and 174 cases less than during the third quarter 1989. There were 366 cases in **wild animals** (87.1% of total) and **9 of these were in bats.** 8 bat cases occurred in northern Germany in areas with no rabies in terrestrial animals such as Schleswig-Holstein (5 cases), Niedersachsen (2 cases), Nordrhein-Westfalen (1 case), and 1 case was reported from Berlin.
54 cases were registered in **domestic animals** (1 dog, 9 cats, 12 cattle, 24 small ruminants, 8 horses).

Concentrations of cases was found in parts of the Bundesländer (federal states) of Hessen (equal to 30% of the total of the Federal Republic of Germany), in Rheinland-Pfalz, Baden-Württemberg and in newly re-infected areas of Bayern (from Austria) and Berlin-West (from the German Democratic Republic).

The figure for ***"This Quarter"***, not considering the 9 bat rabies cases is the lowest recorded in terrestrial animals for any one quarter since the field trials on oral vaccination of foxes against rabies were started in 1983.

* * *

3.8 Finland FIN

by Bengt Westerling

During *"This Quarter"* there were no cases of rabies detected in Finland.

A total of 213 animals were examined for rabies by immunofluorescence; among them 16 cats, 9 dogs, 30 foxes, 132 raccoon dogs and 5 bats.

From the estimated infection area of 1700 km², a total of 288 raccoon dogs, foxes or badgers have been examined for rabies with negative result since the last case was detected on 16 February, 1989.

3.9 France FRA

by M.F.A. Aubert

507 rabies cases were registered during *"This Quarter"*, 208 cases less than during the previous quarter. 420 cases were diagnosed in foxes (82.8% of total), 19 in other wildlife animals and 68 in domestic animals (7 dogs, 16 cats, 21 cattle, 23 small ruminants and 1 horse).

The departments (départements) registering the greatest number of cases during *"This Quarter"* was Doubs with 107 cases.
The oral vaccination of foxes has been carried out or has been started with the vaccines SAG 1 and rabies recombinant in an area of 63820 km² comprizing 44% of the infected area of France.

3.10 Greece GRE

The country remained rabies-free.

3.11 Hungary HUN

by Laslo Koltai

During *"This Quarter"*, 240 rabies cases were reported amounting to an increase of 7.1% compared to the same time span in 1989.- 87.9% of the total cases were in foxes.

The provinces (Komitate) mostly affected by the disease were Vas (34 cases), Pest (21) and Fejer (20) in Transdanubia. The provinces east of the river Danube were the least affected.

3.12 Iceland ICE

The country remained rabies-free.

3.13 Ireland IRE

The country remained rabies-free.

3.14 Italy ITA

by Santino Prosperi

During *"This Quarter"* no case of rabies was reported in Italy.

3.15 Luxembourg LUX

by Joseph Kremer

Rabies cases were again reduced during *"This Quarter"* after an oral immunization campaign against rabies in foxes in May 1990, carried out by helicopter. Only 5 cases were registered, 2 cases in cattle and 3 in foxes.

To consolidate the presently favourable situation of the epizootic in the Grand Duchy of Luxembourg a second vaccination campaign again by helicopter was carried out during the week 24. to 28. September 1990 covering the entire country. This vaccination campaign will no doubt help to improve the state of immunization of the foxes in Luxembourg as well as to control rabies in the border areas of the countries France, Belgium and Germany.

3.16 Netherlands NET

by J.H.M. Nieuwenhuijs

During *"This Quarter"*, a total number of 415 animals (131 adult foxes, 15 young foxes, 5 dogs, 3 cats, 20 badgers, 2 martens, 1 squirrel and 238 bats) were investigated for rabies.
Fifteen bats were reported rabies positive. Seven of those have alredy been determined as *Eptesicus serotinus*.
The four rabies positive bats from the second quarter have also been determined as *Eptesicus serotinus*.

As in the previous year, most of the positive bats have, till now, been found in the province Noord-Holland.

3.17 Norway NOR

by Gudbrand Bakken

There was no case of rabies reported during *"This Quarter"* on the island of Svalbard.

The mainland of Norway remained rabies-free.

3.18 Poland POL

A total of 461 rabies cases were reported from Poland

during *"This Quarter"*. Of these were 358 in wild animals (292 foxes, 30 raccoon dogs, 2 badgers, 16 pine martens, 3 polecats, 11 roe deer, 1 red deer, 1 wild boar, 1 black rat and 1 bat) and 103 in domestic animals (16 dogs, 33 cats, 36 cattle and 18 other domesticated carnivores).
There was an increase of 144 cases compared to the previous quarter.

In the western half of the country rabies cases were more concentrated, in the eastern half more scattered. 10 provinces (voivodeships) in the eastern half of the country had no cases reported.
The **bat rabies** case occurred in the north not far from the Baltic Sea.

3.19 Portugal POR

The country remained rabies-free.

3.20 Romania ROM

by Horatiu Olaru

During *"This Quarter"*, 10 rabies cases were reported from Romania, 8 in domestic animals (1 dog, 5 cats, 1 bovine, 1 sheep) and 2 in foxes.
The cases occurred scattered and throughout the country.

3.21 Spain SPA

by José Luis de Felipe Gardón

During *"This Quarter"*, the mainland and islands of Spain remained **rabies-free** in terrestrial animals.
There was **no case of bat rabies.**
Five rabies cases in dogs were diagnosed in the Spanish territory of Melilla in **North Africa.**

3.22 European Part SSR the Soviet Socialist Republics

by G.F.Koromyslov and B.L.Cherkassky

During *"This Quarter"* 711 animal rabies cases were recorded in the European part of the Soviet Union, 12 cases less than during the second quarter 1990.

Of the 711 cases were **460 (64.7% of total) in domestic animals** - 58 dogs, 79 cats, 303 cattle, 14 small ruminants, 6 horses. 251 cases were in wild animals.

There were **8 cases of rabies in man**, 5 cases in the Russian Soviet Federal Socialist Republic and 3 cases in the Ukrainian Soviet Socialist Republic.

Addendum:
Additionally to the figures on animal rabies cases for 1990 presented in this BULLETIN, there were 4 further human cases during the first quarter 1990 and 3 further human cases during the second quarter 1990.

3.23 Sweden SWE

The country remained rabies-free.

3.24 Switzerland SWI

by Andreas Kappeler

During *"This Quarter"*, the Swiss Rabies Center received 535 animals for examination.
4 (0.7%) of these were positive for rabies. In the previous quarter 5 cases had been recorded (1.4% of 368), whereas 29 of 621 (4.7%) were positive in the third quarter of 1989.

All 4 cases were observed in foxes from the Canton of Jura. The animals have been recovered 0.5 to 4 km from the French border.

During vaccination campaigns in the months of September and October some 63.000 baits have been distributed over an area of approximately 5.000 km², covering the whole border zone towards France.

40 bats (1 *Eptesicus serotinus*, 4 *Myotis daubentonii*, 4 *Myotis myotis*, 6 *Myotis mystacinus*, 5 *Nyctalus noctula*, 2 *Pipistrellus nathusii*, 12 *P. pipistrellus*, 1 *Pipistrellus spec.*, 1 *Plecotus auritus*, 4 *Vespertilio murinus*) examined with immunofluorescence and partially with i.c. inoculation into suckling mice revealed no rabies virus. Switzerland has not experienced any rabies cases in bats yet.

No bite exposures of humans to proven rabid animals were recorded in the third quarter of 1990. The number of people treated for non-bite exposures is not recorded.

3.25 Turkey TUR

During *"This Quarter"*, 138 rabies cases were reported from Turkey. **134 cases (97%) were diagnosed in domestic animals** (81 dogs, 15 cats, 28 cattle, 4 sheep, 2 goats, 1 horse, 2 donkeys, 1 other domesticated herbivore) and **4 in wild animals** (3 wolves, 1 house mouse). The three wolves were registered in the province of Kars at the Turkish border with the Soviet Union.

There was a relatively high incidence in the provinces

Bursa (18 cases), Istanbul (18), Ankara (12) and Samsun (10); all other infected provinces recorded less than 10 cases.

A greater number of provinces in the eastern half of the country and a few in the western half recorded no rabies cases.

3.26 United Kingdom UNK

The country remained rabies-free.

3.27 Yugoslavia YUG

168 rabies cases were reported in Yugoslavia during ***"This Quarter"***, 12 cases more than during the previous quarter and 45 cases less than during the third quarter 1989.
153 of all cases were diagnosed in the **fox (91.1% of total)**, 4 in other wild animals and 11 in domestic animals (1 dog, 5 cats, 2 cattle, 3 sheep).

The distribution of cases has hardly changed compared to the previous quarter - there was concentration of cases in the Slovenian/Croatian border area and there were scattered cases in Bosnia and Herzegovina and Wojwodina.

An unfortunate situation has arisen for Slovenia which successfully freed the disease from the area bordering Italy by practising oral vaccination of foxes. As Istria, part of Croatia, is infected, there is the threat of reinfection of the rabies-free areas of Slovenia from the south.

Information on forthcoming International Symposium

The "Laboratoire de Etudes sur la Rage et la Pathologie des Animaux Sauvages" in Malzéville, France, is organizing the following symposium (co-sponsored by WHO-OIE-IUCN) and sends its first call for the:

SYMPOSIUM ON HEALTH AND MANAGEMENT OF FREE RANGING MAMMALS

Date: 14-18 October 1991
Place: Nancy/France

Topics:
- Invasion, spread and persistence of contagious diseases
- Food Selection
- Behaviour and ecology of hosts, vectors, reservoirs and victims
- Population biology, population dynamics of diseases
- Host/ parasites coevolution
- Diseases of threatened mammals, conservation biology
- Control of vectors, pest and feral or stray animals
- Immunization against rabies, baits, biomarkers, aversive conditioning, repellents

Send your tentative title of communication to:
CNEVA/LERPAS 20e anniversaire B.P. No. 9
54220 Malzéville (France)

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ATTENTION: M. Aubert

4. MISCELLANEOUS ARTICLES

4.1 Rabies in the European Part of the Union of Soviet Socialist Republics (SSR) in 1989

by G.F. Koromyslow and B.L. Cherkassky

TABLE: **Animal and Human Rabies Cases in the European Part of the USSR, 1989**

TERRITORY	DOMESTIC ANIMALS: Dogs	Cats	Cattle	Horses	Others[1]	WILD ANIMALS [2]	Total Animals	HUMAN RABIES
Russia	195	98	706	31	254	345	1629	6
Ukraine	105	250	487	2	20	414	1278	2
Belorussia	29	8	22	19	1	116	195	1
Litva	16	15	26	-	2	42	101	-
Letvia	17	19	26	-	-	185	247	-
Estonia	16	31	15	-	2	99	163	1
Moldavia	1	1	-	-	2	5	9	-
Totals	379	422	1282	52	281	1206	3622	10

[1] including 254 small ruminants, 24 pigs, 3 others;
[2] representing 87.5% foxes. Others see text.

During 1989, 3622 cases of rabies were recorded in the European part of the Soviet Union.

Of 3622 cases were 2416 **(66.7%) in domestic animals** - 379 dogs, 422 cats, 1282 cattle, 254 small ruminants, 52 horses, 24 pigs and 3 other domesticated animals.
1206 cases were in wild animals of which were 87.5% foxes, 7.5% raccoon dogs, 2.6% martens, 1.4% polecats, 0.3% wolves, 0.7% wild ungulates (wild boar, elk).

In man, there were **10 cases of rabies**, 3 cases in the Russian Socialist Federated Soviet Republic, 2 in the Ukrainian Soviet Socialist Republic, 1 in the Belorussian Soviet Socialist Republic, 1 in Estonia.

Animal and human cases are summmarized in the TABLE above.

The main **source of rabies infection in man** were rabid dogs - in 70.5% of the cases. In 8.8% of cases the source of infection were rabid foxes. Most of the cases occured in spring. More than **82% of victims did not ask for primary medical care** and thus they did not receive antirabic treatment. 76.4% of the affected people were males.

About 3% of cases occured in children less than 14 years old.

Localization of the bites of rabid animals were at the face or fingers in 52.9% of cases.

Epizootic Characteristics of the Rabies Situation.

There was a certain increase in the number of detected rabies cases in wild predators as well as in dogs and cats compared to the last year. At the same time the incidence of the disease in farm animals has been stabilized indicating the effectiveness of specific rabies prophylaxis in the livestock grazing in threatened areas.

In the Russian Federation rabies cases were more frequent from time to time in the Central-Black Soil region, Povolzhsky and North Caucasus region. In the north single cases of rabies in predators were recorded only in the Arkhangelsk region.

In infected districts of the Ukraine a regular rise in the rabies epizootic started in the second half of 1989. The number of affected wild animals surpassed the 1988 figure by 64%. Rabies cases in predators were somewhat increased in Latvia. In Belorussia and Moldavia the epizootic situation did not change much; in Lithuania and Estonia it became better.

The epizootic is of the wildlife type; the **main reservoirs** of the disease are **fox and raccoon** dog populations.

4.2 New Areas of Oral Fox Vaccination in Europe, 1990

by Winfried W. Müller

This is the fifth annual reporting on the areas of Oral Vaccination of Foxes against Rabies in Europe in this BULLETIN. Supplementing the report there is a map in the ANNEX showing the vaccinated areas from 1978 to 1989 hatched and the newly vaccinated areas in 1990 dotted.

The WHO Collaborating Centre for Rabies Surveillance and Research, Tübingen, Federal Republic of Germany had invited again to two meetings for a European Cooperation-West (participating countries: Luxembourg, Belgium, France, the Netherlands, Federal Republic of Germany and Switzerland) and -East (participating countries: Austria, Italy, Yugoslavia, Czechoslovakia, Democratic and Federal Republics of Germany and Finland) to discuss the vaccination in border areas, as well as exchanging experience and results gained during the passing year.

It can be seen from the map in ANNEX 3 that in 1990 the new areas of vaccination have been greatly enlarged. Two more countries, Poland and Hungary, have shown interest in oral vaccination and intend to start with selected areas along the German and probably Czech and Austrian border respectively in 1991.

No allowance has been made on the map in the ANNEX for one country which is Finland. Reinfected after 29 years, oral vaccination was practiced from 1988 to 1990 in the infected area in the south of the country. It is now rabies-free. In 1990 an 80 km long and 20 km deep barrier zone was vaccinated stretching from the Gulf of Finland to the Saimaa canal along the border with the Soviet Union.

In western Europe France has deviated from the decision once taken in 1987, namely to have a coherent vaccination area around Luxembourg which was steadily to be enlarged. In autumn 1990 France did not vaccinate along the borders to Belgium, Luxembourg and the Federal Republic any more but vaccinated along the western and southern frontline of the disease inside the country and along the Swiss border.

1989 was a year with high rabies figures throughout Europe and cases in 1990 continue to be of high incidence. That is most likly due to the mild winters 1988/89 and 1989/90 when high fox populations developed. In spite of set-backs in oral vaccination due to the latter and/or in combination with technical shortcomings or lack of money, countries practicing oral vaccination for a longer period had a positive development of their rabies situation in 1990.

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4.3 Report on Seminar of Wildlife Rabies Control

(- Part 1 -)

by Winfried W. Müller

From 2-5 July 1990 a WHO seminar on wildlife rabies control took place in Geneva, Switzerland.

The subjects covered were:

1. Rabies epidemiology according to host species
2. Control methodologies
3. Animal vaccines
4. Safety aspects of vaccines for man, domestic animals and non-target species
5. Vaccine potency
6. Vaccine bait delivery systems
7. The planning and management of field trials for oral immunization of wildlife
8. International cooperation in wildlife rabies research and control.

Papers presented on these subject are going to be published at a later date.

Considering the contents of the papers given at the meeting and from the discussions following these papers the following recommendations were made for future wildlife research in the field of rabies:

GENERAL RECOMMENDATIONS

1. The pathogenesis of rabies needs further elucidation. There is still controversy about problems and circumstances of virus shedding and latency.

2. What constitutes resistance? What is the explanation of the different susceptibilities observed in different animal species?

3. Reliable in vitro potency tests and rapid diagnostic procedures need to be developed and standardized. Such techniques would allow the number of animals required in rabies laboratories to be reduced. Special attention should also be paid to the development of simplified diagnostic tests adapted to field and laboratory conditions in less developed countries.

4. Natural variation in the number of cases (appearance and disappearance of insectivorous bat rabies in Europe, fox rabies in parts of North America, and vampire bat rabies in Central and South America) need to be understood.

5. More knowledge of biological factors which affect different wildlife species - reproduction cycles, territory occupied, interspecies relationships, etc - is needed if such factors are to be utilised in rabies control in the future.

RECOMMENDATIONS FOR SPECIFIC RESEARCH

General

Countries, which currently have little or no rabies, should be encouraged to form a national rabies coordinating committee to bring together agencies responsible for human health and domestic animal, as well as wildlife management.

This committee should be responsible for formulating contingency plans should wildlife rabies outbreaks occur, and coordinating preliminary research on wildlife rabies control measures, including organization of campaigns with placebo baits for training and research purposes.

A subgroup of the WHO Working Group on Arctic Rabies should be formed to coordinate research efforts on Arctic mammalian rabies host species ecology and Arctic rabies epidemiology. The group should include scientists from all participating countries in the holarctic region. It was suggested that two coordinators be nominated: Dr. P.Hersteinsson for the palearctic region and Dr. E. Follmann for the nearctic region
(Recommendation of a WHO-/NVI Workshop on Arctic Rabies held at Uppsala, Sweden, 24-27 April 1990 [WHO document WHO/Rab. Res. /90.35]).

Exchange of information between countries of the holarctic region should receive special attention especially in border areas. Following the occurrence of the rabies outbreak in Finland it is recommended that cooperative projects for strengthened rabies surveillance be initiated through central services with local authorities in the Kola peninsula (Norway/USSR) and along the Finland/USSR border.

The ecology of specific animal hosts:

The Mongoose

1. Studies are needed to find oral rabies vaccines which are effective and safe for mongooses.

2. In certain areas mongoose populations may be extremely large, suggesting that vaccine viruses may be required which are excreted in urine or faeces, and are transmissible from one animal to another to reach a sufficient proportion of the population.

3. The population ecology of the mongoose needs further elucidation. Parameters relevant to the spread and maintenance of rabies in this species must be studied under various ecological conditions (for example, reproductive performance, population turnover, population density, home range sizes, and dispersal).

4. It is also necessary to develop baits for mongooses which:
- routinely deliver an immunising dose of vaccine to each animal
- are attractive to mongooses
- are rarely consumed by non-target species
- can easily be mass produced.

The Arctic Fox

i) Virology

Arctic virus strains can be differentiated from other Lyssaviruses by a battery of monoclonal antibodies. In addition, P41 monoclonal antibody is a useful tool for preliminary screening of rabies isolates from Arctic and sub-Arctic regions. Research on virus strain characterization should consist of:
(a) A comparison of Arctic rabies strains from Alaska, Canada, Greenland, Norway, USSR and Finland. It is recommended that representative strains reacting with P41 should be further studied.

(b) An evaluation of strains carrying the Arctic marker (i.e. positive with P41) from non Arctic parts of the world (e.g. USSR and Nigeria).

(c) Undertaking RNA sequencing of nucleocapsids of a representative Arctic virus strain. The WHO collaborating centre in Tübingen would be ready to undertake this work.

(d) If feasible, serological surveys should be attempted. Rabies positive serum samples should be tested in competitive antibody binding assay employing Arctic rabies virus markers for geographic studies of rabies infections in Arctic and sub-Arctic regions.

Further experimental studies should be carried out on:

(a) The susceptibility to rabies of the major Arctic animal species, including routes of infection and particularly the possibility of infection by ingestion of infected carcasses preserved in permafrost.

(b) The Arctic fox, with special emphasis on the incubation period and the duration and symptoms of clinical illness including the two colour morphs (blue and white). In addition, the duration of virus excretion and the possibility of recovery from the disease should be studied.

ii) Ecology of rabies host

Two eco-epidemiological systems and three research topics have been identified.

In System 1 the main host species are the Arctic/red foxes and domestic dogs. System 1 can be found in mainland North America and Eurasia in the far-north (tundra-/taiga in Arctic/sub-Arctic climates).

The polar strain also affects other wildlife species, such as wolf, reindeer/caribou, polar bear, river otter, wolverine and American feral mink.

The main topics which should be further studied are:

a) the spread of the disease to the freezing/thawing of rivers and oceans, as well as sea-ice movements. A review of the existing information on the subject is needed within the rabies context;

b) the interaction between the different host species involved (e.g. Arctic/red foxes/wolf/domestic dog) with special reference to seasonal and annual variation (quality and quantity) of food availability;

c) the preservation of rabies virus in frozen carcasses in a cold climate and the epidemiology of other diseases including parasite transmission (for comparison either as a model or a marker, e.g. Echinococcus multilocularis, mange, infectious canine hepatitis and distemper virus);

d) the food ecology should be considered with special reference to baiting (attractiveness of frozen baits and foraging behaviour relative to food availability as a way of predicting the success of baiting campaigns).

System 2 occurs in Greenland, Iceland, Spitzbergen and other islands. The main host species is the Arctic fox and,

perhaps, the domestic dog. It is characterized as an Arctic, maritime ecosystem (coastal vegetation, Arctic maritime climate). The virus strain involved is the polar strain (different isolates need to be characterized). The other infected species are: seals, reindeer/caribou, and polar bear.

Topics which need to be studied are as follows:

a) The spread of rabies with reference to the same items as in System 1, plus the role played by ships, aircraft and animal smuggling in the continual cycle of extinction and re-introduction of virus.

b) The interactions between the Arctic fox and domestic dog, as well as secondary susceptible species such as mink, bats, and seals (living, as well as carcasses).

c) The behavioural ecology, with special reference to the characterization of genetically isolated populations.

iii) Epidemiology of Arctic fox rabies

Arctic rabies is defined as a disease of wild carnivores, including Arctic fox, domestic dog and other species, caused by a serotype 1 Lyssavirus within the Arctic and sub-Arctic regions of the northern hemisphere.

The main host species supporting rabies epizootics are the Arctic fox, the red fox, the dog and perhaps the wolf and coyote. In addition, all mammalian species which are preyed upon by the rabies hosts may be infected, including man.

The questions which should be addressed are:
- the prevalence of Arctic virus and rabies antibody in carefully selected samples from carnivores and humans;
- the patterns and mechanisms of the disease spread;
- the mechanisms of virus maintenance in Arctic carnivore populations; of virus transmission, species susceptibility and pathology and virus resistance under ambient conditions;
- the level of risk of transmission from carnivores to human beings;
- the appropriateness of conventional rabies diagnostic tests;
- the eventual relationships between Arctic rabies and other rabies cycles.

iv) Control of Arctic fox rabies by oral immunization

The major areas which require further research are:

- the baiting strategies adapted to Arctic/sub-Arctic areas.
- the development of enteric (or other) vaccines that will not be adversely affected by freezing;
- the environmental factors that could affect the success of a control programme including (but not limited to): (a) physical oceanography with special reference to freezing/-thawing cycles, oceanic currents and ice distribution and movements which may affect movements of target species; (b) ecological studies that will yield insight into interspecific relationships and general co-adaptation of target species and the rabies virus to Arctic/sub-Arctic conditions of relevance to control programmes; and (c) studies of the social behaviour of target species, to increase understanding of elements that would affect the efficiency and effectiveness of a control programme.

The Jackal

There are four recognized species of jackal. They range over most of Africa and the Middle East, Persian Gulf States and the Indian subcontinent. Any comprehensive study of jackal ecology would have to take into consideration these aspects. It is preferable to concentrate on those areas, species and populations which play a significant role in the epidemiology of rabies. The first step is, therefore, to identify these.

Jackal ecology has been especially studied in *Canis aureus* and *Canis mesomelas* in areas of South and East Africa. This research has been motivated by the predation of livestock by jackals. Particular attention should should now be paid to those aspects of jackal ecology most important in the epidemiology of rabies and the immunization of the jackal population.

These include the following:

(a) Population density, sizes of defended territory and home range and overlap of territories in co-existing jackal species and different age classes; preferred habitats.

b) Population dynamics - birth rate, natural death rates in juveniles and adults under optimal and sub-optimal conditions, including response to population reduction; migration and dispersion; natural causes of mortality.

(c) Preferred foods and foraging behaviour, communal feeding and watering (suitability of such areas for bait

placement), distances and routes of foraging.
(d) Preferred baits and attractants, how they are chewed, and bait uptake with respect to population density and age classes.

(e) Interaction (competition and predation) with other species of carnivores and especially dogs, including peri-urban areas and also areas left in their natural state.

The European Bats

The insectivorous bats which occur in Europe are classified as protected and endangered species. This limits the opportunities to do active research in the field, although passive research is still possible. However, there is a potential hazard to man, and in each affected European country the disease first came to light through contact between a rabid bat and a member of the public. Public understanding of the risk posed by handling rabid bats is often inadequate.

The following recommendations are therefore made:

(a) Conduct public awareness campaigns to provide essential information about all aspects of bat rabies.

(b) Fundamental research into bats and bat rabies. This research should be in cooperation with biologists, virologists, epidemiologists and those who make decisions in the fields of animal and public health.

(c) Uniform guidelines and procedures for dealing with bats which are presented for examination must be laid down, and should include provision for species determination. Detailed enquiries are necessary when rabies is diagnosed in any species other than *Eptesicus serotinus*.

(d) Development of new vaccines which can be used to immunize bats.

(e) Research should be carried out to answer the following questions:
- How does infection spread?
- How many virus strains are involved?
- Does cross infection between different bat species occur?

Since these questions are difficult to address completely in field studies, other possibilities which mimic natural conditions should be considered. The determination of monoclonal profiles of viruses from bats and terrestrial animal species should be continued.

Large scale surveys are not recommended when dealing with an endangered species unless procedures have been strictly defined and carried out in close cooperation with bat research workers and those concerned with the protection of bats.

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*Based on document WHO/CDS/VPH/90.93 published at WHO Headquarter, Geneva, Switzerland).

Part 2 of this report on the seminar in Geneva will consider all recommendations in connection with vaccines and vaccination and will be dealt with in the next issue of the BULLETIN.

TABLE 1

EUR EUROPE 3/90 RABIES CASES 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
AUT	AUSTRIA	2	1	2	-	6	-	11	312	20	41	21	1	395		406
BEL	BELGIUM	-	-	5	1	-	-	6	4	-	1	-	-	5		11
BUL	BULGARIA *							0						0		0
CZE	CZECHOSLOVAKIA	11	17	1	-	1	-	30	261	1	11	2	-	275		305
DDR	GERMAN DEM. REPUBLIC	24	48	62	4	88	1	227	642	9	32	22	1	706		933
DEN	DENMARK *							0						0		0
DEU	FED.REP. OF GERMANY	1	9	12	8	24	-	54	312	12	18	12	12	366		420
FIN	FINLAND *							0						0		0
FRA	FRANCE	7	16	21	1	23	-	68	420	4	11	4	-	439		507
GRE	GREECE *							0						0		0
HUN	HUNGARY	3	19	4	-	-	1	27	211	1	1	-	-	213		240
ICE	ICELAND *							0						0		0
IRE	IRELAND *							0						0		0
ITA	ITALY *							0						0		0
LUX	LUXEMBOURG	-	-	2	-	-	-	2	3	-	-	-	-	3		5
NET	NETHERLANDS							0	-	-	-	-	15	15		15
NOR	NORWAY *							0						0		0
POL	POLAND	16	33	36	-	-	18	103	292	2	19	12	33	358		461
POR	PORTUGAL *							0						0		0
ROM	ROMANIA	1	5	1	-	1	-	8	2	-	-	-	-	2		10
SPA	SPAIN 1)	5	-	-	-	-	-	5						0		5
SSR	SOVIET SOCIALIST REP	58	79	303	6	14	-	460	-	-	-	-	251	251	8	719
SWE	SWEDEN *							0						0		0
SWI	SWITZERLAND + LIECHT							0	4	-	-	-	-	4		4
TUR	TURKEY	81	15	28	1	6	3	134	-	-	-	-	4	4		138
UNK	UNITED KINGDOM *							0						0		0
YUG	YUGOSLAVIA	1	5	2	-	3	-	11	153	1	-	2	1	157		168
TOTAL		210	247	479	21	166	23	1146	2616	50	134	75	318	3193	8	4347
PER CENT		4.8	5.7	11.0	0.5	3.8	0.5	26.4	60.2	1.2	3.1	1.7	7.3	73.5	0.2	100.0

* NO CASES, 1) NORTH AFRICA.

TABLE 2

EUR EUROPE 1-3/90 RABIES CASES 1. 1.90 - 30. 9.90

LOCATION CODE NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
AUT AUSTRIA	9	17	6	1	15	-	48	1581	79	104	72	2	1838		1886
BEL BELGIUM	2	10	51	4	5	-	72	48	3	6	-	-	57		129
BUL BULGARIA *							0						0		0
CZE CZECHOSLOVAKIA	26	40	1	-	5	1	73	911	9	32	5	1	958		1031
DDR GERMAN DEM. REPUBLIC	140	138	111	10	169	2	570	1776	28	86	93	9	1992	1	2563
DEN DENMARK *							0						0		0
DEU FED.REP. OF GERMANY	9	47	39	13	42	-	150	1208	52	43	87	24	1414		1564
FIN FINLAND *							0						0		0
FRA FRANCE	37	64	88	28	145	1	363	1913	21	39	16	2	1991		2354
GRE GREECE *							0						0		0
HUN HUNGARY	28	52	24	-	3	3	110	638	1	3	5	2	649		759
ICE ICELAND *							0						0		0
IRE IRELAND *							0						0		0
ITA ITALY *							0						0		0
LUX LUXEMBOURG	-	2	13	1	7	-	23	32	-	1	1	1	35		58
NET NETHERLANDS							0	-	-	-	-	19	19		19
NOR NORWAY 1)							0	-	-	-	-	1	1		1
POL POLAND	69	94	61	-	1	29	254	993	14	39	41	101	1188		1442
POR PORTUGAL *							0						0		0
ROM ROMANIA	5	7	4	-	1	-	17	8	1	-	-	-	9		26
SPA SPAIN 2)	6	-	-	-	-	-	6						0		6
SSR SOVIET SOCIALIST REP	298	303	778	25	305	2	1711	338	-	-	-	504	842	15	2568
SWE SWEDEN *							0						0		0
SWI SWITZERLAND + LIECHT							0	14	-	-	-	-	14		14
TUR TURKEY	338	27	59	2	12	9	447	-	-	-	-	9	9		456
UNK UNITED KINGDOM *							0						0		0
YUG YUGOSLAVIA	9	16	3	-	5	-	33	529	3	5	3	4	544		577
TOTAL	976	817	1238	84	715	47	3877	9989	211	358	323	679	11560	16	15453
PER CENT	6.3	5.3	8.0	0.5	4.6	0.3	25.1	64.6	1.4	2.3	2.1	4.4	74.8	0.1	100.0

* NO CASES, 1) ISLAND OF SVALBARD, 2) NORTH AFRICA.

TABLE 3

EUR EUROPE 3/90 RABIES CASES 'OTHER ANIMAL SPECIES' 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	OTHER DOMESTIC ANIMALS					OTHER WILD ANIMALS											TOTAL
		OTH.DOM. CARNIVOR	DONKEY	PIG	OTH.DOM. HERBIVOR	DOMESTIC RABBIT	WOLF	RACOON DOG	BROWN BEAR	RACOON	WILD BOAR	CHAMOIS	INSECTIV BAT	SQUIRREL	BLACK RAT	HOUSE MOUSE	OTHERS	
AUT	AUSTRIA	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
DDR	GERMAN DEM. REPUBLIC	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	2
DEU	FED.REP. OF GERMANY	-	-	-	-	-	-	-	1	1	-	-	9	1	-	-	-	12
HUN	HUNGARY	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
NET	NETHERLANDS	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	15
POL	POLAND	18	-	-	-	-	-	30	-	-	1	-	1	-	1	-	-	51
SSR	SOVIET SOCIALIST REP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	251	251
TUR	TURKEY	-	2	-	1	-	3	-	-	-	-	-	-	-	-	1	-	7
YUG	YUGOSLAVIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
TOTAL		18	2	1	1	1	3	30	1	1	2	1	25	1	1	1	252	341
PER CENT		5.3	0.6	0.3	0.3	0.3	0.9	8.8	0.3	0.3	0.6	0.3	7.3	0.3	0.3	0.3	73.8	100.0

AUT AUSTRIA — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
103	EISENSTADT - LAND	-	1	-	-	-	-	1	4	-	-	-	-	4		5
104	GUESSING							0	15	-	-	-	-	15		15
105	JENNERSDORF							0	2	-	-	-	-	2		2
106	MATTERSBURG							0	1	-	-	-	-	1		1
107	NEUSIEDL AM SEE							0	15	-	-	-	-	15		15
108	OBERPULLENDORF							0	3	-	-	-	-	3		3
109	OBERWART							0	5	-	-	-	-	5		5
205	SANKT VEIT AN DER GL							0	1	-	-	-	-	1		1
208	VOELKERMARKT							0	3	-	-	-	-	3		3
308	GAENSERNDORF							0	1	-	1	-	-	2		2
309	GMUEND							0	2	-	2	-	-	4		4
310	HOLLABRUNN							0	-	-	-	1	-	1		1
311	HORN							0	20	-	4	1	-	25		25
313	KREMS AN DER DONAU-L	-	-	-	-	1	-	1	21	3	6	-	-	30		31
314	LILIENFELD							0	4	-	-	-	-	4		4
315	MELK							0	6	2	5	1	-	14		14
318	NEUNKIRCHEN							0	28	-	7	6	-	41		41
319	SANKT POELTEN-LAND	1	-	-	-	-	-	1						0		1
320	SCHEIBBS							0	1	-	-	-	-	1		1
321	TULLN							0	4	-	-	-	-	4		4
322	WAIDHOFEN AN DER THA							0	6	-	1	-	-	7		7
323	WIENER NEUSTADT-LAND							0	6	-	-	-	-	6		6
325	ZWETTL							0	10	-	4	-	-	14		14
404	BRAUNAU AM INN							0	12	2	3	1	-	18		18

AUT CONTINUED — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
406	FREISTADT							0	8	-	1	-	-	9		9
407	GMUNDEN							0	1	-	-	-	-	1		1
409	KIRCHDORF AN DER KRE							0	2	-	-	-	-	2		2
411	PERG							0	15	4	1	4	-	24		24
412	RIED IM INNKREIS							0	1	-	-	-	-	1		1
417	VOECKLABRUCK							0	2	-	-	-	-	2		2
503	SALZBURG-LAND	1	-	-	-	-	-	1						0		1
601	GRAZ-STADT	-	-	-	-	1	-	1						0		1
602	BRUCK AN DER MUR	-	-	-	-	3	-	3	43	8	4	5	1	61		64
603	DEUTSCHLANDSBERG							0	1	-	-	-	-	1		1
604	FELDBACH							0	27	-	-	-	-	27		27
605	FUERSTENFELD							0	1	-	-	-	-	1		1
606	GRAZ-LAND							0	4	-	-	-	-	4		4
607	HARTBERG	-	-	1	-	-	-	1	-	-	1	-	-	1		2
610	LEIBNITZ							0	2	-	-	-	-	2		2
611	LEOBEN	-	-	-	-	1	-	1	7	1	-	1	-	9		10
612	LIEZEN	-	-	1	-	-	-	1	19	-	1	-	-	20		21
613	MUERZZUSCHLAG							0	3	-	-	-	-	3		3
615	RADKERSBURG							0	5	-	-	-	-	5		5
617	WEIZ							0	1	-	-	1	-	2		2
TOTAL		2	1	2	0	6	0	11	312	20	41	21	1	395	0	406
PER CENT		0.5	0.2	0.5	0.0	1.5	0.0	2.7	76.8	4.9	10.1	5.2	0.2	97.3	0.0	100.0

RABIES CASES															1. 7.90 - 30. 9.90	
LOCATION	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
CODE NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
BEL BELGIUM															
LG LIEGE	-	-	2	1	-	-	3	2	-	-	-	-	2		5
LX LUXEMBOURG	-	-	2	-	-	-	2	2	-	1	-	-	3		5
NA NAMUR	-	-	1	-	-	-	1						0		1
TOTAL	0	0	5	1	0	0	6	4	0	1	0	0	5	0	11
PER CENT	0.0	0.0	45.5	9.1	0.0	0.0	54.5	36.4	0.0	9.1	0.0	0.0	45.5	0.0	100.0
LUX LUXEMBOURG															
02 CAPELLEN	-	-	1	-	-	-	1	1	-	-	-	-	1		2
05 MERSCH							0	1	-	-	-	-	1		1
09 WILTZ	-	-	1	-	-	-	1						0		1
13 REMICH							0	1	-	-	-	-	1		1
TOTAL	0	0	2	0	0	0	2	3	0	0	0	0	3	0	5
NET NETHERLANDS															
01 DRENTHE							0	-	-	-	-	2	2		2
02 FRIESLAND							0	-	-	-	-	1	1		1
03 GELDERLAND							0	-	-	-	-	2	2		2
04 GRONINGEN							0	-	-	-	-	1	1		1
07 NOORD-HOLLAND							0	-	-	-	-	5	5		5
08 OVERIJSSEL							0	-	-	-	-	3	3		3
09 UTRECHT							0	-	-	-	-	1	1		1
TOTAL	0	0	0	0	0	0	0	0	0	0	0	15	15	0	15

CZE C Z E C H O S L O V A K I A R A B I E S C A S E S 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
00	DISTRICT OF PRAGUE							0						0		0
01	CENTRAL BOHEMIA	-	1	-	-	-	-	1	14	-	-	-	-	14		15
02	SOUTH BOHEMIA	1	-	-	-	-	-	1	22	-	-	-	-	22		23
03	WEST BOHEMIA	-	4	-	-	-	-	4	28	-	1	-	-	29		33
04	NORTH BOHEMIA	3	3	1	-	-	-	7	81	-	5	1	-	87		94
05	EAST BOHEMIA	1	2	-	-	-	-	3	26	-	-	-	-	26		29
06	SOUTH MORAVIA	-	1	-	-	-	-	1	15	1	1	-	-	17		18
07	NORTH MORAVIA	-	1	-	-	1	-	2	23	-	-	1	-	24		26
0	CZECH SOCIALIST REPUBL	5	12	1	-	1	-	19	209	1	7	2	-	219		238
10	DISTRICT OF BRATISLAV							0	4	-	2	-	-	6		6
11	WEST SLOVAKIA	4	-	-	-	-	-	4	15	-	1	-	-	16		20
12	CENTRAL SLOVAKIA	1	4	-	-	-	-	5	15	-	-	-	-	15		20
13	EAST SLOVAKIA	1	1	-	-	-	-	2	18	-	1	-	-	19		21
1	SLOVAC SOCIALIST REPUB	6	5	-	-	-	-	11	52	-	4	-	-	56		67
TOTAL		11	17	1	0	1	0	30	261	1	11	2	0	275	0	305
PER CENT		3.6	5.6	0.3	0.0	0.3	0.0	9.8	85.6	0.3	3.6	0.7	0.0	90.2	0.0	100.0

DDR GERMAN DEMOCRATIC REPUBLIC — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	Rostock	-	4	2	-	-	-	6	21	-	3	-	-	24		30
02	Schwerin	-	4	4	-	-	-	8	26	-	1	2	-	29		37
03	Neubrandenburg	-	-	1	-	-	-	1	42	-	3	1	-	46		47
04	Potsdam	2	4	16	-	-	-	22	80	-	5	1	-	86		108
05	Frankfurt	-	1	-	-	-	-	1	26	-	1	-	-	27		28
06	Cottbus	1	2	3	-	2	-	8	43	-	2	1	-	46		54
07	Magdeburg	3	2	12	3	1	-	21	63	1	2	1	-	67		88
08	Halle	5	4	1	-	1	-	11	37	-	1	-	1	39		50
09	Erfurt	2	-	4	-	4	-	10	75	1	2	4	-	82		92
10	Gera	-	1	-	-	2	-	3	14	-	-	-	-	14		17
11	Suhl	1	-	-	-	-	-	1	9	-	2	1	-	12		13
12	Dresden	3	4	2	-	13	-	22	27	3	-	1	-	31		53
13	Leipzig	4	17	9	1	24	1	56	71	1	5	4	-	81		137
14	Chemnitz	2	5	8	-	41	-	56	100	3	4	4	-	111		167
15	Berlin, Hauptstadt	1	-	-	-	-	-	1	8	-	1	2	-	11		12
TOTAL		24	48	62	4	88	1	227	642	9	32	22	1	706	0	933
PER CENT		2.6	5.1	6.6	0.4	9.4	0.1	24.3	68.8	1.0	3.4	2.4	0.1	75.7	0.0	100.0

DEU FEDERAL REPUBLIC OF GERMANY — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
010	SCHLESWIG-HOLSTEIN	-	-	1	-	-	-	1	-	-	-	-	5	5		6
020	HAMBURG							0						0		0
031	BRAUNSCHWEIG	-	1	-	2	-	-	3	12	-	1	-	-	13		16
032	HANNOVER							0	1	-	-	-	-	1		1
033	LUENEBURG	-	-	1	-	-	-	1	4	-	-	-	-	4		5
034	WESER-EMS							0	-	-	-	-	2	2		2
040	BREMEN							0						0		0
051	DUESSELDORF							0						0		0
053	KOELN							0						0		0
055	MUENSTER							0						0		0
057	DETMOLD							0	5	-	1	-	1	7		7
059	ARNSBERG							0						0		0
064	DARMSTADT	-	1	4	1	9	-	15	45	3	2	6	-	56		71
065	GIESSEN	-	-	2	-	-	-	2	6	1	-	-	-	7		9
066	KASSEL	-	1	2	-	5	-	8	28	2	3	2	1	36		44
071	KOBLENZ							0	2	-	2	-	-	4		4
072	TRIER	-	1	-	-	-	-	1	1	-	-	-	-	1		2
073	RHEINHESSEN-PFALZ	-	2	-	2	1	-	5	42	1	-	1	1	45		50
081	STUTTGART	-	-	-	-	1	-	1	30	1	2	2	-	35		36
082	KARLSRUHE	-	-	-	1	-	-	1	16	1	1	1	-	19		20
083	FREIBURG							0						0		0
084	TUEBINGEN	-	-	1	1	-	-	2	6	1	1	-	-	8		10
091	OBERBAYERN	-	-	-	-	1	-	1	32	-	1	-	-	33		34
092	NIEDERBAYERN							0						0		0
093	OBERPFALZ	-	1	-	-	-	-	1	3	-	-	-	-	3		4
094	OBERFRANKEN							0	2	-	-	-	-	2		2
095	MITTELFRANKEN							0	4	-	-	-	-	4		4
096	UNTERFRANKEN	-	1	-	-	-	-	1	3	-	-	-	-	3		4
097	SCHWABEN	-	-	-	-	2	-	2	24	2	-	-	-	26		28
100	SAARLAND	-	1	1	1	4	-	7	12	-	2	-	-	14		21
110	BERLIN (WEST)	1	-	-	-	1	-	2	34	-	2	-	2	38		40
TOTAL		1	9	12	8	24	0	54	312	12	18	12	12	366	0	420
PER CENT		0.2	2.1	2.9	1.9	5.7	0.0	12.9	74.3	2.9	4.3	2.9	2.9	87.1	0.0	100.0

FRA FRANCE RABIES CASES 1. 7.90 - 30. 9.90

LOCATION CODE NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
02 AISNE	2	1	-	-	1	-	4	26	-	-	-	-	26		30
03 ALLIER							0	1	-	-	-	-	1		1
08 ARDENNES	-	2	4	-	-	-	6	15	-	-	-	-	15		21
10 AUBE							0	13	-	-	-	-	13		13
21 COTE D'OR	-	-	1	-	-	-	1	8	-	1	-	-	9		10
25 DOUBS	3	2	5	-	4	-	14	87	3	1	2	-	93		107
27 EURE	-	-	-	-	1	-	1	9	-	-	-	-	9		10
39 JURA	-	1	3	-	1	-	5	26	-	-	-	-	26		31
51 MARNE	-	-	-	1	-	-	1	19	-	2	1	-	22		23
52 MARNE (HAUTE)	-	1	-	-	1	-	2	2	-	-	-	-	2		4
54 MEURTHE ET MOSELLE	-	-	1	-	4	-	5	38	-	-	-	-	38		43
55 MEUSE	-	1	-	-	1	-	2	15	-	-	-	-	15		17
57 MOSELLE	1	2	2	-	-	-	5	12	-	1	-	-	13		18
58 NIEVRE	-	1	-	-	1	-	2	5	-	-	-	-	5		7
60 OISE	-	1	1	-	1	-	3	6	-	-	-	-	6		9
67 RHIN (BAS)	-	-	-	-	1	-	1	11	-	1	-	-	12		13
68 RHIN (HAUT)	-	1	-	-	-	-	1	11	-	1	1	-	13		14
70 SAONE (HAUTE)	1	1	1	-	1	-	4	22	-	1	-	-	23		27
71 SAONE ET LOIRE	-	-	1	-	3	-	4	6	-	1	-	-	7		11
76 SEINE MARITIME	-	1	2	-	-	-	3	13	1	2	-	-	16		19
77 SEINE ET MARNE							0	16	-	-	-	-	16		16
80 SOMME	-	1	-	-	-	-	1	9	-	-	-	-	9		10
88 VOSGES	-	-	-	-	2	-	2	25	-	-	-	-	25		27
89 YONNE	-	-	-	-	1	-	1	16	-	-	-	-	16		17
90 TERR.DE BELFORT							0	1	-	-	-	-	1		1
95 VAL D'OISE							0	8	-	-	-	-	8		8
TOTAL	7	16	21	1	23	0	68	420	4	11	4	0	439	0	507
PER CENT	1.4	3.2	4.1	0.2	4.5	0.0	13.4	82.8	0.8	2.2	0.8	0.0	86.6	0.0	100.0

HUN HUNGARY — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	BUDAPEST							0	2	-	-	-	-	2		2
02	BARANYA	-	1	-	-	-	-	1	14	-	-	-	-	14		15
03	BACS-KISKUN	-	2	3	-	-	-	5	6	-	-	-	-	6		11
04	BEKES	-	1	-	-	-	-	1	4	-	-	-	-	4		5
05	BORSOD-ABAUJ-ZEMPLEN	-	3	-	-	-	-	3	15	-	-	-	-	15		18
06	CSONGRAD	-	2	-	-	-	-	2	3	-	-	-	-	3		5
07	FEJER	-	-	-	-	-	1	1	19	-	-	-	-	19		20
08	GYOER-SOPRON	-	2	-	-	-	-	2	11	-	-	-	-	11		13
09	HAJDU-BIHAR	-	-	1	-	-	-	1	6	-	-	-	-	6		7
10	HEVES							0	1	-	-	-	-	1		1
11	KOMAROM	-	2	-	-	-	-	2	14	-	-	-	-	14		16
12	NOGRAD	-	1	-	-	-	-	1	8	-	-	-	-	8		9
13	PEST	-	1	-	-	-	-	1	20	-	-	-	-	20		21
14	SOMOGY	1	1	-	-	-	-	2	12	1	-	-	-	13		15
15	SZABOLCS-SZATMAR	-	1	-	-	-	-	1	4	-	-	-	-	4		5
16	SZOLNOK							0	3	-	-	-	-	3		3
17	TOLNA	2	-	-	-	-	-	2	15	-	-	-	-	15		17
18	VAS	-	1	-	-	-	-	1	33	-	-	-	-	33		34
19	VESZPREM	-	1	-	-	-	-	1	15	-	1	-	-	16		17
20	ZALA							0	6	-	-	-	-	6		6
TOTAL		3	19	4	0	0	1	27	211	1	1	0	0	213	0	240
PER CENT		1.3	7.9	1.7	0.0	0.0	0.4	11.3	87.9	0.4	0.4	0.0	0.0	88.8	0.0	100.0

POL POLAND RABIES CASES 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01	WARSZAWA							0	5	-	1	-	-	6		6
05	BIALYSTOK							0	2	-	-	-	1	3		3
07	BIELSKO-BIALA							0	-	-	1	-	-	1		1
09	BYDGOSZCZ	1	3	4	-	-	-	8	17	-	1	-	1	19		27
13	CIECHANOW							0	2	-	-	-	-	2		2
17	ELBLAG	-	1	2	-	-	-	3	1	-	-	-	-	1		4
19	GDANSK	1	-	3	-	-	-	4	13	-	1	1	4	19		23
21	GORZOW	1	4	-	-	-	-	5	7	-	-	-	1	8		13
23	JELENIA GORA	-	1	-	-	-	-	1	11	-	3	-	-	14		15
25	KALISZ	1	-	-	-	-	-	1	6	-	-	-	-	6		7
27	KATOWICE	-	-	-	-	-	18	18	2	-	-	-	-	2		20
29	KIELCE	-	2	-	-	-	-	2	5	-	-	-	-	5		7
31	KONIN							0	1	-	1	-	-	2		2
33	KOSZALIN	1	-	3	-	-	-	4	26	-	-	1	3	30		34
35	KRAKOW							0	5	-	-	-	-	5		5
39	LEGNICA	-	1	-	-	-	-	1	5	-	-	-	-	5		6
41	LESZNO	1	-	-	-	-	-	1	4	-	5	-	-	9		10
45	LOMZA							0	1	-	-	-	-	1		1
51	OLSZTYN	1	1	9	-	-	-	11	4	-	1	-	9	14		25
53	OPOLE	1	4	-	-	-	-	5	40	-	-	2	-	42		47
57	PILA	1	-	-	-	-	-	1	12	-	1	1	1	15		16
59	PIOTRKOW TRYB	1	1	-	-	-	-	2	6	-	-	-	-	6		8
61	PLOCK	-	1	-	-	-	-	1	1	-	-	-	-	1		2
63	POZNAN	1	1	-	-	-	-	2	32	-	2	3	2	39		41
67	RADOM							0	2	-	-	-	-	2		2
71	SIEDLCE	-	2	1	-	-	-	3	9	1	1	-	-	11		14
73	SIERADZ							0	2	-	-	-	-	2		2
75	SKIERNIEWICE							0	1	-	-	-	-	1		1
77	SLUPSK	-	2	3	-	-	-	5	18	-	-	2	3	23		28
79	SUWALKI	-	-	2	-	-	-	2	-	-	-	-	1	1		3
81	SZCZECIN	1	-	1	-	-	-	2	18	-	-	-	4	22		24
83	TARNOBRZEG							0	7	-	-	1	-	8		8
85	TARNOW							0	-	1	-	-	-	1		1
87	TORUN	1	2	4	-	-	-	7	5	-	1	-	3	9		16
89	WALBRZYCH	-	3	1	-	-	-	4	8	-	-	-	-	8		12
91	WLOCLAWEK	-	2	-	-	-	-	2	1	-	-	-	-	1		3
93	WROCLAW	-	2	1	-	-	-	3	6	-	-	-	-	6		9
97	ZIELONA GORA	3	-	2	-	-	-	5	7	-	-	1	-	8		13
TOTAL		16	33	36	0	0	18	103	292	2	19	12	33	358	0	461
PER CENT		3.5	7.2	7.8	0.0	0.0	3.9	22.3	63.3	0.4	4.1	2.6	7.2	77.7	0.0	100.0

RABIES CASES 1. 7.90 - 30. 9.90

LOCATION CODE NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
ROM ROMANIA															
04 BACAU	1	–	–	–	–	–	1						0		1
07 BOTOSANI	–	1	–	–	–	–	1						0		1
10 BUZAU	–	–	1	–	–	–	1						0		1
22 HUNEDOARA							0	1	–	–	–	–	1		1
25 MARAMURES	–	2	–	–	1	–	3	1	–	–	–	–	1		4
32 SALAJ	–	2	–	–	–	–	2						0		2
TOTAL	1	5	1	0	1	0	8	2	0	0	0	0	2	0	10
SPA SPAIN															
52 MELILLA (NORTH AFRICA)	5	–	–	–	–	–	5						0		5
SWI SWITZERLAND AND LIECHTENSTEIN															
26 JURA							0	4	–	–	–	–	4		4
YUG YUGOSLAVIA															
10 SR BOSNA I HERCEGOVIN	1	2	1	–	2	–	6	12	–	–	–	1	13		19
30 SR HRVATSKA	–	–	1	–	1	–	2	79	–	–	–	–	79		81
50 SR SLOVENIJA	–	1	–	–	–	–	1	55	1	–	2	–	58		59
61 SAP VOJVODINA	–	2	–	–	–	–	2	7	–	–	–	–	7		9
TOTAL	1	5	2	0	3	0	11	153	1	0	2	1	157	0	168
PER CENT	0.6	3.0	1.2	0.0	1.8	0.0	6.5	91.1	0.6	0.0	1.2	0.6	93.5	0.0	100.0

SSR UNION OF SOVIET SOCIALIST REPUBLICS RABIES CASES 1. 7.90 - 30. 9.90															
LOCATION	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
CODE NAME	DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
01 RSFSR	24	9	126	3	3	-	165	-	-	-	-	48	48	5	218
02 MOLDAVIAN SSR	1	-	1	-	-	-	2	-	-	-	-	2	2		4
03 UKRAINIAN SSR	14	50	122	-	4	-	190	-	-	-	-	57	57	3	250
04 BYELORUSSIAN SSR	3	5	15	3	-	-	26	-	-	-	-	32	32		58
05 LITHUANIAN SSR	6	2	24	-	-	-	32	-	-	-	-	1	1		33
06 LATVIAN SSR	7	11	8	-	-	-	26	-	-	-	-	46	46		72
07 ESTONIAN SSR	3	2	7	-	7	-	19	-	-	-	-	65	65		84
TOTAL	58	79	303	6	14	0	460	0	0	0	0	251	251	8	719
PER CENT	8.1	11.0	42.1	0.8	1.9	0.0	64.0	0.0	0.0	0.0	0.0	34.9	34.9	1.1	100.0

TUR TURKEY — RABIES CASES — 1. 7.90 - 30. 9.90

LOCATION CODE	NAME	DOMESTIC ANIMALS							WILD ANIMALS						HUMAN CASES	TOTAL
		DOG	CAT	CATTLE	HORSE	SHEEP GOAT	OTHERS	TOTAL	FOX	BADGER	OTHER MUSTEL	DEER	OTHERS	TOTAL		
001	ADANA	1	-	-	-	-	-	1						0		1
002	ADIYAMAN	-	-	-	-	-	1	1						0		1
003	AFYON	1	-	-	-	-	-	1						0		1
006	ANKARA	4	5	1	-	2	-	12						0		12
007	ANTALYA	-	-	1	-	2	-	3						0		3
009	AYDIN	1	-	-	-	-	-	1						0		1
010	BALIKESIR	1	1	-	-	-	-	2						0		2
012	BINGOEL	1	-	-	-	-	-	1						0		1
014	BOLU	2	-	-	-	-	-	2						0		2
016	BURSA	10	2	3	-	2	1	18						0		18
017	CANAKKALE	2	-	-	-	-	-	2						0		2
019	CORUM	1	-	-	-	-	-	1						0		1
022	EDIRNE	1	-	1	-	-	-	2						0		2
025	ERZURUM	2	-	-	-	-	-	2						0		2
026	ESKISEHIR	-	-	1	-	-	-	1						0		1
027	GAZIANTEP	3	-	-	-	-	-	3						0		3
031	HATAY	1	-	1	-	-	1	3						0		3
034	ISTANBUL	13	5	-	-	-	-	18						0		18
035	IZMIR	7	1	-	-	-	-	8	-	-	-	-	1	1		9
036	KARS							0	-	-	-	-	3	3		3
037	KASTAMONU	1	-	-	-	-	-	1						0		1
038	KAYSERI	3	-	-	-	-	-	3						0		3
040	KIRSEHIR	-	-	1	-	-	-	1						0		1
041	KOCAELI	2	-	1	-	-	-	3						0		3
042	KONYA	1	-	-	-	-	-	1						0		1
046	KAHRAMAN MARAS	1	-	-	1	-	-	2						0		2
047	MARDIN	1	-	-	-	-	-	1						0		1
049	MUS	-	-	1	-	-	-	1						0		1
050	NEVSEHIR	1	-	1	-	-	-	2						0		2
052	ORDU	2	-	2	-	-	-	4						0		4
054	SAKARYA	7	-	1	-	-	-	8						0		8
055	SAMSUN	4	-	6	-	-	-	10						0		10
057	SINOP	1	-	2	-	-	-	3						0		3
059	TEKIRDAG	2	-	-	-	-	-	2						0		2
063	URFA	1	-	1	-	-	-	2						0		2
066	YOZGAT	1	-	-	-	-	-	1						0		1
067	ZONGULDAK	2	1	4	-	-	-	7						0		7
TOTAL		81	15	28	1	6	3	134	0	0	0	0	4	4	0	138
PER CENT		58.7	10.9	20.3	0.7	4.3	2.2	97.1	0.0	0.0	0.0	0.0	2.9	2.9	0.0	100.0

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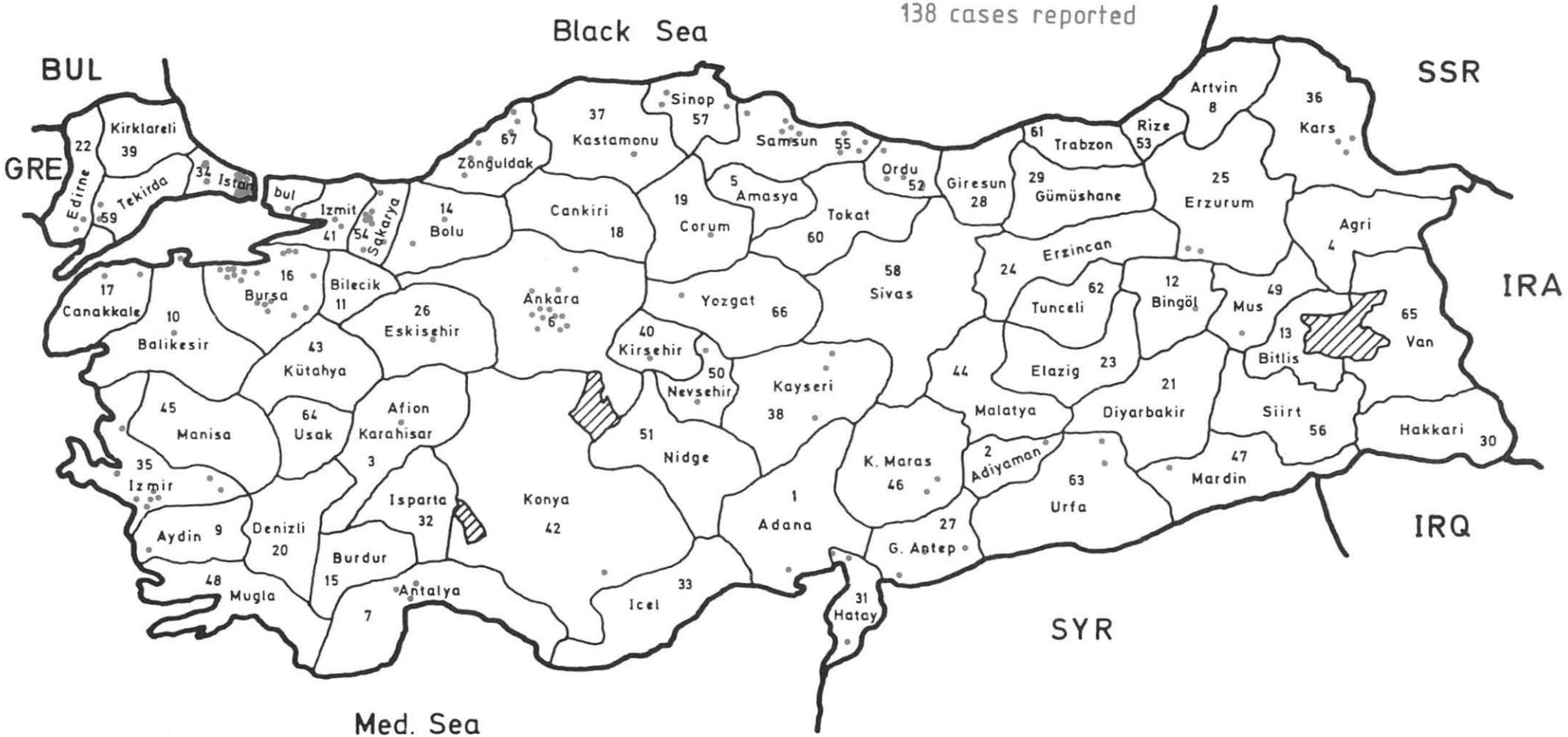
United Kingdom UNK
Dr. K.C. Meldrum
Dr. A.D. Hayward
Ministry of Agriculture, Fisheries and Food

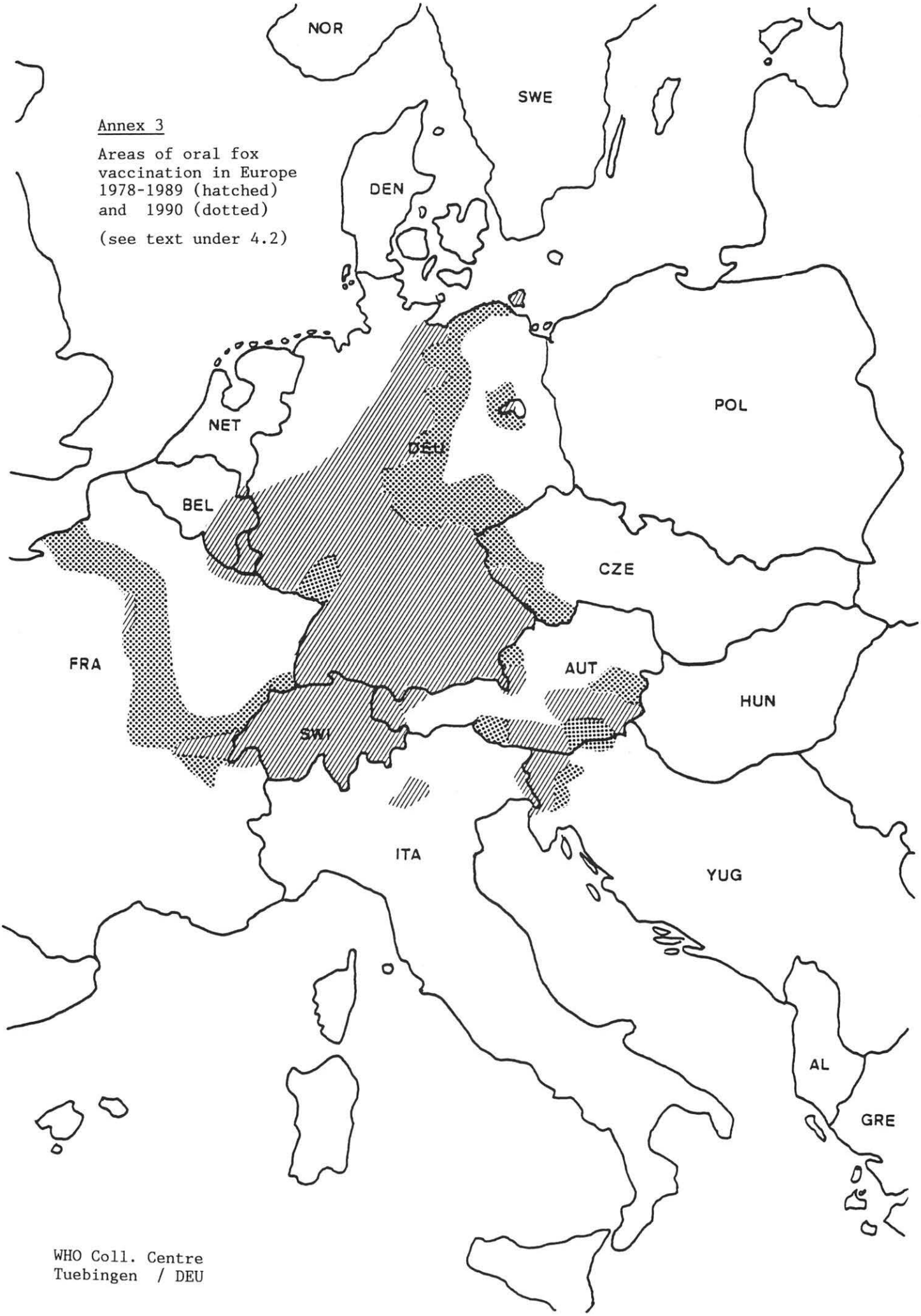
Yugoslavia YUG
Dr. M. Radovanovic
Fed. Committee Agriculture

Dr. Milos Petrovic
Pasteur Institute, Novi Sad

WHO Coll. Centre
Tuebingen / DEU

Rabies Cases Turkey
3rd Quarter 1990
138 cases reported





Annex 3

Areas of oral fox vaccination in Europe 1978-1989 (hatched) and 1990 (dotted)

(see text under 4.2)

WHO Coll. Centre
Tuebingen / DEU

WHO Coll. Centre
Tuebingen / DEU

Rabies Cases Europe
3rd Quarter 1990
4347 cases reported
25 bat rabies cases included

ICE
(rabies free)

NOR
(mainland
rabies free)

FIN
(0)

SWE
(rabies free)

DEN
(0)

IRE
(rabies free)

UNK
(rabies free)

NET
(15)

BEL
(11)

(411)
(9)
DEU

(933)
DDR

POL
(460)
(1)

SSR
(719)

CZE
(305)

FRA
(507)

(406)
AUT

HUN
(240)

SWI
(4)

ITA
(0)

YUG
(168)

ROM
(10)

BUL
(rabies free)

POR
(rabies free)

SPA
(5)
(in North Africa)

ALB
(no data)

GRE
(rabies free)

TUR
(138)

0 50 100 km

(rabies free) = no indigenous case reported for at least two years