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 **Fourth Quarter 1997**, subsequently referred to as ***"This Quarter"***.

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

SECTION 3 (3.1-3.38) reflects the **situation for individual countries**. Unfortunately, not all countries report regularly yet. However, their contribution is expected.

In the **Miscellaneous** SECTION (4) under 4.1 an article is presented on the distribution technique of vaccine baits in regard to **oral vaccination of foxes** against rabies. In 4.2 several **imported human rabies** cases in France over the more recent years are described.

The **rabies case data** are tabulated **for the Fourth Quarter 1997** in SECTION 5. The arrangement of countries follows practical considerations, not alphabetical ones.

SECTION 6 lists the **official contributors** to the BULLETIN.

The **geographical distribution** of rabies cases in Europe **of the Fourth Quarter 1997** is shown on maps of the Russian Federation, Turkey and Europe in the ANNEX.

2. SUMMARY OF RABIES IN EUROPE

2.1 Fourth quarter 1997

During ***"This Quarter"***, **1421 rabies cases** were reported **in Europe**. Of these 898 were in wild animals, 521 in domestic animals and 2 in humans.

Of the **898 cases in wild animals**, 783 were foxes, 3 wolves, 57 raccoon dogs, 1 wild cat, 7 badgers, 15 pine martens, 1 polecat, 2 ferrets, 1 mouse weasel, 8 raccoons, 2 roe deer, 1 red deer, 6 insectivorous bats, 1 squirrel, 2 black rats, 7 other wild animals and 1 unspecified animal. Of the **521 domestic animals**, 130 were dogs, 126 cats, 239 bovines, 10 horses, 11 sheep, 2 goats, 2 pigs and 1 other domesticated carnivore.

There were **2 human cases** reported from the Russian Federation.

The above data are presented in TABLES 5.1 and 5.3 of SECTION 5 and in the TABLES of the individual countries.

Compared to the previous quarter (985 cases - corrected figure) an increase is noticed (by 436 cases). That is expected as **wildlife rabies is seasonal** and, the increase in autumn is connected to the dispersal of young foxes born in spring of the year which causes an increased contact rate. Most of the countries recorded this increase.

There were **6 bat rabies cases** recorded in the Netherlands (4), Denmark (1) and Germany (1). Because of the distinct epidemiological features of the disease, the cases are marked in a different colour in the map of the ANNEX.

Turkey, the only country in Europe following the pattern of **dog-mediated rabies** and not showing obvious seasonility recorded a decrease (from 43 cases in the previous quarter to 33).

Rabies-free countries in Europe participating in the surveillance were: Albania, Finland, Greece, Iceland, Ireland, Italy, Norway, Portugal, the mainland and islands of Spain, Sweden and Macedonia.

There were **no cases** in Austria and the United Kingdom of Britain and Northern Ireland, but the last indigenously acqui-

red case (terrestrial or bat) was less than two years ago.

The status of the countries with data supplied irregularly cannot be judged.

2.2 Development and trends in 1997

Summary:

Rabies case data summarizing the year 1997 can be found in TABLES 5.2 and 5.4 of SECTION 5.

The number of cases in 1997 totals 5076. The four quarters compare as follows (corrected figures):

1st quarter	- 1582
2nd quarter	- 1088
3rd quarter	- 985
4th quarter	- 1421

The total in 1997 is the lowest figure since the beginning of this surveillance system in 1977, the highest figure being 24,377 in 1989.

Wildlife or fox-mediated rabies:

After analysing the development of rabies in Europe it was said in issue 4/96 of this BULLETIN on page 16 that a reduction of rabies cases can be expected for the year 1997. Exactly that has happended. There was a reduction of cases from 8080 in 1996 to 5076 in 1997.

While there was slow progress in the years 1993 to 1996, mostly due to set-backs of oral vaccination with reinfected areas and recurring residual foci, there was a drastic improvement in 1997. However, the set-backs just mentioned still happen and **it is strongly suggested to adjust the method of oral vaccination in as much as vaccine baits per annum and area (km²) are to be increased when high or increased fox populations are expected!** (see articles RBE issues 1/95, pp 14-15 and issue 4/95, pp 13-16).

However, there is reason to mention the progress. If one takes for example the total cases of the 15 EU member countries, it amounted to 103, not considering the bat rabies cases, the one imported human case and the 5 cases of Spain in North Africa. The greatest share of the 103 cases went to Germany (83) followed by Belgium (9), Austria (8), Luxembourg (2) and France (1). Looking at the domestic animals there was no case in dogs, only one in a cat, 9 in bovines and 2 in sheep - all animals which must have had contact to rabid foxes on pastures or in the forest.

Urban- or dog-mediated rabies:

Normally, Turkey is listed among the other European countries. However, it is of a different rabies pattern altogether - the urban or dog-mediated rabies. In 1997 it accounted for only 2.8% of the total rabies cases in Europe.

Turkey recorded 138 cases in domestic and 4 cases in wild animals in 1997. There was a total of 125 cases in 1996.

Bat rabies:

Bat rabies has its own epidemiological pattern and is therefore separately presented wherever possible.

With 142 cases recorded in 1987 cases have diminished continuously to 6 in 1995. With 16 cases in 1996 and now 25 cases in 1997 the question arises if there is a further increase of infected bat populations to be expected. There is no control measure yet possible.

Four countries were affected in 1997: Denmark (8), Germany (3), France (1) and the Netherlands (13).

Human rabies:

There were 12 human cases reported in 1997: 1 imported case in France, 1 case in Lithuania and 10 cases in the Russian Federation.

In 1996 there were only 8 cases reported.

3. RABIES IN INDIVIDUAL COUNTRIES

3.1 Albania ALB

by K. Berxholi

The country remained rabies-free.

3.2 Austria AUT

by Helmut Schnabl

Of 5226 animal samples examined for rabies ***"This Quarter"***, no rabies case was diagnosed.

Summary 1997

The total of rabies cases amounted to 8 cases (7 foxes, 1 bovine), 6 cases less than in the previous year. - In all infected areas of Austria oral vaccination of foxes against rabies is practiced.

3.3 Belgium BEL

by L. Hallet

During ***"This Quarter"***, 2 cases of rabies were diagnosed in 2 bovines at Bastogne. Since the 1st January 1997, 46 foxes, 2 bovines, 3 cats and 1 dog had been examined for rabies in this region with negative results.

In this region oral vaccination was carried out at the end of October 1997 using 18 vaccine baits per km². Four weeks later a second vaccination was practiced using 24 vaccine baits per km² plus carrying out an important extension of the area into the territory of the Grand Duchy of Luxembourg.

Summary 1997

In 1997 the following 9 cases were diagnosed:
Namur - 2 foxes, 1 marten;
Luxembourg - 3 foxes, 3 bovines.

The marten case of Namur is an unusual one, as the animal might have been transported to the locality where it was found and diagnosed rabid. In that vicinity there was no rabies for many years.

The Institut de Santé Publique Louis Pasteur examined 865 samples for rabies with negative results: 590 foxes (68% of total), 111 bovines, 64 cats, 30 dogs, 10 small ruminants, 10 horses, and 50 others (13 stone martens, 8 badgers, 4 ferrets, 4 polecats, 4 bats, 3 pine martens, 3 rats, 3 roe deer, 2 mouse weasels, 2 squirrels, 1 fallow deer, 1 hamster, 1 hind and 1 buzzard).

Three oral vaccination campaigns were carried out during the year:

- In March an area of 8900 km² was covered using 158,700 vaccine baits (density 17.7/km²).
- At the end of May a vaccination was carried out with the aim to specially reach the young foxes at the den in an area of 4600 km². At 3101 dens with 12645 entrances 33773 vaccine baits were placed.
- The last campaign in November covered 9057 km² using 154,975 vaccine baits thus, coming to a density of vaccine baits per km² of 17.1.

3.4 Bosnia and Hercegovina BIH

No data.

3.5 Bulgaria BUL

by L. Lavchev

During ***"This Quarter"***, only one case was reported from Bulgaria in the very north-east of the country.

Summary 1997

15 cases were reported during the year (2 dogs, 1 horse, 12 animals unspecified), 17 cases less than in the previous year.

3.6 Belarus BYE

by S.N. Shpilevsky

During ***"This Quarter"***, 10 rabies cases (in 7 wild animals, 2 dogs and 1 bovine) were reported for the months November and December 1997.

Summary 1997

The total amounts to 62 cases, 82 cases less than in 1996. However, there were no reports received for the months June to October 1997.

3.7 Croatia CRO

by Sanja Šeparović

During *"This Quarter"*, 127 cases of rabies were diagnosed in 72 municipalities of Croatia. There were concentration of cases in the north of the country.

Summary 1997

A total of 429 cases was reported, 59 cases less than in the previous year. Of the total 373 cases were in foxes (86.9%), 13 in other wild animals and 43 in domestic animals (9 dogs, 16 cats, 11 bovines, 1 horse, 1 donkey, 2 sheep, 3 goats).

3.8 Czech Republic CZH

by Oldrich Matouch

A total of 33 rabies cases was reported during *"This Quarter"*, 4 cases more than during the previous quarter and 42 cases less than during the fourth quarter 1996.

All rabies cases occurred in wild animals (32 foxes, 1 roe-deer).

The districts Příbram (6) and Mělník (5) in Central Bohemia were the most affected areas.

An oral vaccination campaign was carried out in October covering an area of 49,800 km². 838,000 Lysvulpen (BIOVETA SAD-Bern) vaccine doses were layed out manually in 55 districts. Aerial distribution was performed in 4 highly affected districts in North Bohemia in an area of 3500 km² using 100,000 doses.

Summary 1997

In 1997, a total of 9111 animals belonging to 49 species were examined for rabies in the Czech Republic. Rabies was diagnosed in 238 cases, 1 more than in 1996.

The highest incidence was registered in foxes - 224 cases (94.1%). The other animals involved were martens (4), roe deer (3), badger (1) and cat (6). As in 1996, no case was registered in a dog.

Concentration of rabies cases was noticed in Central and North Bohemia.

3.9 Denmark DEN

by Eric Stougaard

There was one bat rabies case reported during *"This Quarter"*.

Summary 1998

8 cases of bat rabies were reported during 1997 compared to none in 1996. The cases were distributed throughout the country.

3.10 Germany, Federal Republic DEU

by Winfried W. Müller and Hartmut Schlüter

A total of 25 rabies cases in animals was reported during *"This Quarter"*, 11 cases more than during the previous quarter and 8 cases less than during the fourth quarter 1996 (33).

Four active foci still exist in spite of intensive oral vaccination. These foci are in the west of Germany and affect the following Federal States: Nordrhein-Westfalen (14 cases), Rheinland-Pfalz (3), Hessen (4) and Saarland (3).

There was 1 bat rabies case in the Federal State of Sachsen-Anhalt.

Summary 1997

The annual total amounted to 86, 67 cases less than in 1996. Set-backs with oral vaccination seem to be coped with by using alternative methods (increased vaccine baits per area and year). 86 cases was the lowest recording since 1977, the peak recording being 9163 in 1983.

There were 3 bat rabies cases compared to 10 in the previous year.

3.11 Estonia EST

by Matti Nautras

During *"This Quarter"*, 33 animal rabies cases were registered in Estonia, 11 cases less than during the previous quarter and 4 cases more than during the 4th quarter 1996.

Summary 1997

There were 150 cases recorded in 1997, 51 cases more than during the previous year. Of the 150 cases, 119 were in wild animals (73 foxes, 36 raccoon dogs, 1 badger, 8 raccoons, 1 squirrel) and 31 in domestic animals (12 dogs, 8 cats, 9 bovines, 2 sheep).

Rabies occurred throughout the country.

3.12 Finland FIN

by Riitta Heinonen

The country remained rabies-free.

Surveillance 3rd and 4th quarters 1997:

A total of 243 animals were examined for rabies by immunofluorescence test on brain tissue, all with negative results: 141 raccoon dogs, 1 elk, 1 lynx, 3 brown bears, 38 arctic foxes, 11 cats, 4 dogs, 1 insectivorous bat, 1 beaver, 8 badgers, 3 bovines, 3 pine martens, 1 wolf and 27 other wild carnivores.

3.13 France FRA

by Michel F.A. Aubert

There was only 1 fox diagnosed rabid during ***"This Quarter"***. The case was located near the German border.

Surveillance

1343 samples were investigated for rabies during ***"This Quarter"*** with negative results.

Summary 1997

In France were 3 rabies cases registered during 1997: 1 imported human case, 1 bat rabies case and 1 fox.

Editors note:

The human cases mentioned in article 4.2 of this BULLETIN, if not already registered will appear in our next summary report to be prepared in issue 4/98.

3.14 Federal Republic FRY of Yugoslavia

by Milijana Simić

20 rabies cases in animals (16 foxes, 2 dogs, 2 cats) were registered during ***"This Quarter"*** in the Federal Republic of Yugoslavia. These cases were located in Serbia (10), Wojwodina (8) and Montenegro (2).

Summary 1997

The annual total amounted to 98 cases, 6 cases more than in the previous year.

3.15 Greece GRE

by B. Stylas

The country remained rabies-free.

3.16 Hungary HUN

by Bálint Kerekes

During ***"This Quarter"***, 174 rabies cases in animals were registered, 50 cases more than during the previous quarter and 86 less than during the 4th quarter 1996.

Animal distribution involved in the disease as well as case distribution geographically were similar to the previous quarter.

Summary 1997

There was a total of 571 rabies cases in 1997, 786 cases less than in 1996 (1357). This large reduction was possible partly due to the fact that the oral vaccination area could be extended for the west of Hungary up to the River Danube.

3.17 Iceland ICE

The country remained rabies-free.

3.18 Ireland IRE

The country remained rabies-free.

3.19 Italy ITA

by Santino Prosperi

The country remained rabies-free.

Summary 1997

No rabies cases were diagnosed in animals in Italy. Surveillance was carried out in all Alpine Regions as follows:

1. 89 wild animals (76 foxes) and 161 domestic animals were examined in Piemonte, Valle d'Aosta and Liguria;
2. 597 wild animals (545 foxes) and 194 domestic animals were examined in Lombardia;
3. 2564 wild animals (2242 foxes) and 275 domestic animals were examined in Trentino Alto Adige, Veneto and Friuli Venezia Giulia.

On 3 February 1997, the Ordinance of the Ministry of Health made the vaccination compulsory for dogs, cattle, sheep, goats and equines in areas at risk of Friuli Venezia Giulia Region. The Health Authorities of Lombardia, Veneto and Trentino Alto Adige Re-

gions will consider the compulsory vaccination in areas at risk, in connection with the presence of rabies in the bordering countries.

Oral vaccination of foxes was carried out during the spring in the provinces of Trieste, Gorizia and Udine in an area of 1,600 km² using 25,000 vaccine baits.

3.20 Lithuania LTU

by K. Lukauskas and A. Dranseika

During *"This Quarter"*, rabies increased in Lithuania from a total of 56 cases in the previous quarter to 86 cases. Of the 86 cases 48 were in domestic animals (3 dogs, 7 cats, 3 horses, 35 bovines) and 38 in wild animals (16 foxes, 13 raccoon dogs, 8 pine martens, 1 weasel).The most affected districts were Pakruojis, Šilutė, Tauragė, Klaipėda, and Biržai.

During *"This Quarter"*, more than 30 thousand dogs were vaccinated against rabies.

The oral vaccination of foxes was practiced and 100,000 vaccine baits were distributed in 23 districts.

There was no human rabies case reported in the country.

Summary 1997

The annual total of rabies cases amounted to 180, 76 cases more than in the previous year. In the total 1 human case was included.

3.21 Luxembourg LUX

by Joseph Kremer

During *"This Quarter"*, 1 rabies case in a fox occurred in December approx. 2-3 km away from the national borders France as well as Germany. As there was another case close to the German border in September after 13 months without rabies in Luxembourg, it is obvious that the fight against rabies has not yet ended. Oral vaccination has to continue in cooperation with the neighbouring countries. It is intended to carry out 2 vaccination campaigns one in spring and the other in autumn in 1998 with "Raboral" vaccine baits.

Summary 1997

Out of a total of 74 animals examined during the year there were 2 rabies cases, compared to 17 in 1996.

3.22 Latvia LVA

by J. Rimeicāns and Z. Andersons

During *"This Quarter"*, there were 23 rabies cases in 14 districts, 18 cases less than during the previous quarter. Of these 12 were in wild animals and 11 in domestic animals. Of the cases in wild animals 7 were foxes, 4 raccoon dogs and 1 badger. Of the 11 domestic animals 6 were dogs, 3 cats and 2 bovines. The most affected district was Saldus with 5 cases.

There were no rabies cases in humans.

Summary 1997

The annual total amounted to 141, 45 cases less than in 1996.

3.23 Moldova MLD

by V. Bahau, V. Orlov and L. Tertiak

Out of 31 samples (7 bovines, 7 cats, 11 dogs, 1 sheep, 5 other wild animals) examined for rabies during *"This Quarter"* at the veterinary investigation centre of the Moldavian Republic 10 cases were diagnosed rabid: 2 cats in Criuleansci, 1 fox and 5 bovines in New Anena, 1 fox in Orhei and 1 fox in Taracliya.

Summary 1997

The total amounted to 22 cases, 9 cases more than in 1996.

3.24 Netherlands NET

by G. Visser

During *"This Quarter"*, 26 animals (2 foxes, 2 dogs, 1 cat, 1 squirrel and 20 bats) were investigated for rabies. The disease was diagnosed in 4 bats.

Summary 1997

In 1997 276 animals (12 foxes, 8 dogs, 3 cats, 1 bison, 1 mouse, 4 squirrels and 247 bats) were investigated routinely for rabies. 21 animals suspected of rabies could not be tested as they were decayed. Additionally, 260 bats from the Blijdorp zoo in Rotterdam (*Rousettus aegyptiacus*) were tested after the EBL 1 virus had been confirmed in their

colony in an artificial cave (see report in issue 3/97 of the RABIES BULLETIN EUROPE).

The total of rabid bats in the Netherlands amounted to 13, 8 more than in 1996.

3.25 Norway NOR

by Gudbrand Bakken

The country remained rabies-free.

3.26 Poland POL

by Henryk Maciolek

A total of 333 rabies cases was registered in Poland during ***"This Quarter"***, 50 cases more than during the previous quarter but 150 cases less than during the fourth quarter 1996.

Summary 1997

The total number of cases amounted to 1495, 1031 cases less than in 1996. Oral vaccination, started in 1993, has nearly freed the western half of the country. Rabies cases have been reduced by more than half compared to the total of 1992 - 3084 cases.

3.27 Portugal POR

The country remained rabies-free.

3.28 Romania ROM

by Ioan Liviu Mitrea

During ***"This Quarter"***, 8 rabies cases were registered in Romania in 2 foxes, 1 badger, 2 dogs, 1 cat and 2 bovines. These cases were distributed in 5 provinces throughout the country.

Summary 1997

The annual total amounted to 34 cases, 8 cases less than in the previous year.

3.29 Russia RUS (European part only)

by V.A.Vedernikov, V.A.Sedov, P.N.Pitalev,V.E.Semljanova, B.L.Cherkasskiy, V.V.Seliverstov, V.F.Pilinin, and S.A. Kolomizev

During ***"This Quarter"***, 428 rabies cases in animals were reported. Of the total number of cases 264 were in domestic animals - 70 dogs, 52 cats, 129 cattle, 5 horses, 6 sheep, 2 pigs. Of 164 wild animals rabies was diagnosed in 153 foxes, 5 raccoon dogs, 2 wolves, 2 ferrets, 1 pine marten, 1 rat.

Most affected were the Kursk Region with 36 cases, Bashkortostan with 28 cases.

There were 2 human cases reported in the Twer Region and the Krasnodar Territory.

Summary 1997

The annual total amounted to 1076 cases, 708 cases less than in 1996.

3.30 Spain SPA

by Carlos Abellán García

During ***"This Quarter"***, the mainland and islands of Spain remained rabies-free.

There was 1 case in a dog in Melilla (North Africa).

Summary 1997

The annual total amounted to 5 cases (4 dogs, 1 horse) in Melilla (North Africa), compared to 1 dog in Ceuta, also in North Africa, in 1996.

3.31 Slovak Republic SVK

by Jozef Sokol and Bohuslav Lovas

A total of 62 rabies cases in animals was reported in the Slovak Republic during ***"This Quarter"***. Of these 55 (88.7% of total) were in wild animals (51 foxes, 1 badger, 1 pine marten, 1 wild cat and 1 black rat) and 7 (11.3% of total) in domestic animals (1 dog, 5 cats, 1 bovine).

An oral vaccination campaign of foxes against rabies was carried out in November 1997, on the territory of 15 districts of the Slovak Republic. The vaccine KAMARK was distributed by hand using a total of 68,422 vaccine baits.

Summary 1997

The annual total amounted to 259 cases. There were 85 cases less compared to 1996. More than 329,182 dogs, 4631 cats, 11247 bovines, 5592 sheep, 588 goats and 1359 fur animals were vaccinated against rabies throughout the year.

3.32 Slovenia SVN

by Zoran Kovač

Only 2 fox rabies cases were diagnosed during ***"This***

Quarter".

Summary 1997

A total of 29 rabies cases was recorded during this year in Slovenia. 18 of the total were diagnosed in foxes, 6 in domestic cats, 1 in a dog, 1 in a bovine, 2 in martens and 1 in a polecat.

There is a considerable decrease from 247 cases in 1996 compared to this year. This is the result of oral immunization campaigns that were carried out in the previous years. Unfortunately, no oral immunization campaign was carried out in 1997. It is planned for 1998.

3.33 Sweden SWE

The country remained rabies-free.

3.34 Switzerland SWI

by Urs Breitenmoser

During ***"This Quarter"***, one rabies cases was discovered in Switzerland: a young dog imported from Morocco. As for the surveillance of the rabies epizootic in Switzerland, a total of 263 animals (201 foxes) were examined and none (0%) were found to be positive for rabies.

Summary 1997

1997 was the first year without an endemic case of rabies since the disease reached Switzerland in 1967. One can be optimistic that the epizootic came to an end thirty years after its start. The potential area of rabies in Switzerland is still situated in the north-west of the country, from the cantons of Jura and Bern in the west to the Canton of Aargau in the north.

5 bats (1 *Nyctalus leisleri*, 1 *Pipistrellus kuhli*, 2 *Pipistrellus nathusii*, 1 *Pipstrellus pipistrellus*) were examined for rabies in this quarter, all were found to be negative for rabies.

A quarterly report of the Swiss Rabies Centre at the University of Bern is also available on the Internet (http://ubeclu.unibe.ch/ivv/index.html) in English, German, and French.

3.35 Turkey TUR

by Celal Özcan

During ***"This Quarter"***, 33 rabies cases were reported in Turkey in 27 dogs, 5 bovines and 1 sheep. In 14 provinces (Il) between 1 and 7 cases were recorded, 26 cases in the western half of the country and 7 in the eastern half.

Summary 1997

The total of cases amounted to 142 (117 dogs, 6 cats, 13 bovines, 1 donkey, 1 sheep, 2 wolves, 1 fox, 1 house mouse), 17 cases more compared to the previous year.

From the distribution of animals involved in the disease it can be seen: Turkey is the only European country with dog-mediated rabies.

3.36 Macedonia TYM

The country remained rabies-free.

3.37 Ukraine UKR

No data.

3.38 United Kingdom UNK

by W.J. Pollitt

The country remained rabies-free in terrestrial mammals.

No cases of European Bat Lyssavirus have been reported during ***"This Quarter"***.

No cases of rabies in humans have occurred during ***"This Quarter"***.

Surveillance 1997

Third Quarter 1997

Reports of suspect rabies outside quarantine were investigated on 7 occasions during the third quarter of 1997. Three cases, in a dog, a cat and a fox were resolved by veterinary staff and three bats and a feral raccoon were found to be negative on laboratory examination.

83 bats were examined for rabies during the period, all with negative results.

Fourth Quarter 1997

A single suspect case in a squirrel was found to be negative on laboratory examination.

36 bats were examined during ***"This Quarter"*** all with negative results.

4. MISCELLANEOUS ARTICLES

4.1 How to do the wrong thing with the highest possible precision - a reflection on the use of GPS in rabies vaccination campaigns

by U. Breitenmoser and U. Müller
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Introduction

The use of the Global Positioning System (GPS) was featured prominently in the discussion at the conference for the co-ordination of rabies vaccination campaigns in western Europe on 30 January, 1998. The use of GPS in the aerial distribution of vaccine bait has marked an important advance in rabies vaccination over the past two years. However, we must not ignore the fact that GPS is no more than a tool to enhance and measure the precision of the bait delivery system, and that – if the bait delivery plan *per se* is wrong, the use of GPS will do nothing to improve it. In this article, we will reflect on the use of GPS in aerial distribution of rabies vaccine baits and the significance of the design of the bait distribution strategy underlying the technical system. As Switzerland does not use aerial bait distribution or GPS, our contribution may look provocative; and indeed – we hope to provoke thoughts on the strategy of baiting and the plot of bait distribution rather than concentrating on the technical instruments.

Advantages and limits of GPS

For the Global Positioning System, a number of transmitter satellites circle the earth, allowing any GPS receiver on the earth to compute its own position by relocating the satellites. The accuracy of a GPS location can be within a few meters, depending on the number of satellites within the range of the receiver and on the availability of reference receivers at known positions. If a fixed-wing plane equipped with an autopilot, a GPS receiver, and an automatic device to discharge the baits is used for the distribution of the rabies vaccine baits, the plane's position at the ejection time can be determined within some meters. There is an additional uncertainty of the final position of the bait caused by shift while falling. Normally, the position of the plane at the time of bait launching is recorded by means of a computer, permitting the subsequent plotting of a map showing the flight route and the position of each bait discharged. There can be no doubt that the GPS has considerably improved the documentation of bait distribution. However, a good documentation of the distribution is not synonymous with a good distribution strategy. On the contrary: if the plan is inappropriate, it may even be disadvantageous to follow it too exactly. A few years ago, the distribution of vaccine baits by means of a plane guided by a pilot with an aerial map on his knees and an airsick human launcher in the back was a rather stochastic act, even if the team in the aeroplane tried to stick to the plan as close as possible. However, this "random" release of vaccine baits resulted in a wider distribution of the baits which may have been better than the strict dropping of the baits along a straight line.

The importance of the bait distribution plot

A few simple graphic models serve to illustrate our concern. An aerial baiting system generally follows the design shown in Fig. 1a: In an area with a given distribution of a target species – in our example territorial red foxes – parallel lines are flown, along which the baits are dropped. Two parameters define the distribution of the baits: (1) the distance between the lines, and (2) the distances between the baits. A typical layout may be to fly lines at a distance of 1000 meters, dropping a bait every 67 meters, which results in a overall bait density of 15/km^2 (Fig. 1a).

The principle of oral vaccination against rabies is for every fox to have access to vaccine baits. If a target species such as the red fox has a territorial tenure system, enough baits for all animals residing within a territory must be dropped there. Although this is a simple and obvious axiom, knowledge about the distribution and abundance of the vector species has rarely been available for the consideration of the design of the vaccination campaigns. Consequently, bait distribution and density have been determined empirically. Although this empirical approach has most often turned out to be efficient and successful, there is one big danger: If the preconditions change, the system may no longer work, the reasons for its failure may not be obvious.

If the vaccine baits are delivered by hand or by helicopter, the strategy is to distribute them as evenly as possible. In this case, the availability of baits to any individual fox is mainly defined by the bait density and the intra- and interspecific competition for baits. The fixed-wing plane however does not favour a dispersed distribution, and as a consequence, the distribution (together with the density) of the baits becomes an important factor regarding the availability of vaccine baits to the target species. Furthermore, the row of baits has the effect that an animal can specialise to find the baits. The straighter the line and the shorter the distance between two baits, the easier it will be for an individual fox or even a wild boar to pick up a number of them.

In recent years, many European countries have had problems with the efficiency of the oral vaccination of foxes against rabies because of the increased fox abundance. In many places, fox densities are believed to have increased 5-10 times since the first application of oral vaccination. The usual response to these problems was to increase the number of baits dropped per km^2. If the baits are distributed by fixed-wing planes, this aim is achieved by increasing the number of baits released per kilometer flown. To simply decrease the distance between single baits may, however, not have the desired effect. Fig. 1b shows a situation with a two-fold density increase for both foxes and baits. We assume that the size of the fox territories decreases linearly with the increased fox density. Although the overall ratio "baits per fox" remains the same an in the example shown in Fig. 1a, many fox territories in Fig. 1b do not get any vaccine bait, because the mean diameter of a fox home range is now less than 1000 meters, and hence a home range may fall between two lines. In such a situation, it would be much more reasonable to decrease the distance between the two lines than the distance between the baits. Fig. 1c shows the same increase of the fox and bait density as assumed in Fig. 1b, but with a different distribution of the baits. In the Fig. 1c example, every fox home range receives some baits.

We are aware of the fact that the relation between fox density and home range size is not simply a linear one. On the other hand, fox density can also increase because of a change in the social system, resulting in more individuals per territory. Furthermore, not every fox uses the entire territory within the few days the vaccine baits are available and effective, therefore the real temporary range of an individual fox might be much smaller than the family's territory. Furthermore, the distribution and shape of fox territories are not random, as in our models, but will be influenced by the distribution of ecological resources, suitable habitat, and

natural and artificial barriers. Our model is simplistic, whereas reality is very complex. This complexity calls even more for a careful design of the baiting system and for a distribution plan adapted to the local fox population.

A vaccination system should never be repeated uncritically just because it proved to be successful in another place or at a different time. The efficiency of a bait delivery system depends on the habitat, the landscape, and the fox abundance. Some or all of these parameters differ between localities, and the baiting system has to be adapted to the local conditions. Unfortunately, we often lack the socio-ecological information about the local fox population needed to adjust the vaccination system, and hence have to start out with a presumable plot and then improve it empirically. For the control and revising of a baiting system, an accurate documentation of the bait delivery can be crucial. And for this process, a GPS is a most efficient tool.

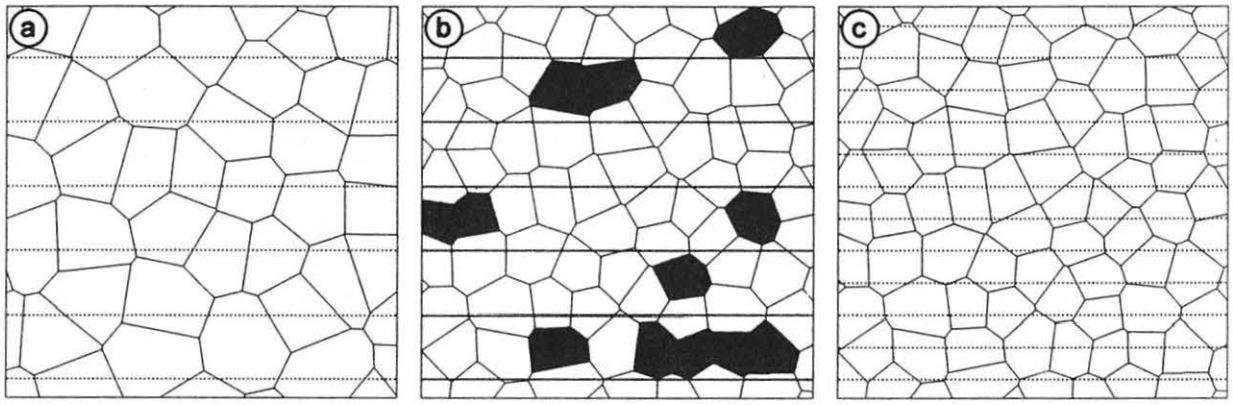

Figure legend:

Fig. 1. Model of fox territories (shown as polygons) and bait distribution along parallel lines flown by a fixed-wing plane. The fox territories were plotted randomly within a pre-defined range. The parameters used are:

a) Mean size of fox territory: 1 km^2 (range 0.5-2.0 km^2); distance between flight lines: 1000 m; distance between baits: 67 m; bait density: 15 km^2. All territories receive at least a few baits.

b) Mean size of fox territory: 0.5 km^2 (range 0.25-1.0 km^2); distance between flight lines: 1000 m; distance between baits: 33 m; bait density: 30 km^2. Some territories (dark shaded) will not receive any baits.

c) Mean size of fox territory: 0.5 km^2 (range 0.25-1.0 km^2); distance between flight lines: 500 m; distance between baits: 67 m; bait density: 30 km^2. All territories receive vaccine baits.

4.2 Imported human rabies cases in France

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The last indigenously acquired human rabies case occurred in France in 1924.

Particularly, no indigenously acquired human case has been reported since the beginning of the vulpine epizootic in 1968. Simultaneously, 14 imported rabies cases occurred from 1977 to 1993. Since 1994, 5 cases have been reported in French residents returning for holiday into their country of origin or as tourists:

Case 1

In December 1994, a 46 year old man native to Mali but resident in Créteil, died of rabies. He had been bitten by a rabid dog in Mali in September 1994 and had received one injection of an unknown vaccine. He returned to France at the end of September and was hospitalized mid December for loss of weight and fever. He was agitated, confused and hydrophobic when he arrived at the hospital. Rabies was suspected and he was isolated. Samples of saliva, a skin biopsy and CSF were taken for diagnosis and found negative. Meanwhile, he was found to be HIV positive.

He died 12 days after being hospitalized. Rabies antigen was found on brain and skin biopsies using the direct immunofluorescence test, Elisa, and isolation on neuroblastoma cells. 36 post-exposure treatments (PET) were applied to family members and hospital staff.

Case 2

In March 1996, a 3 and a half year old boy, died from rabies in the French Island La Réunion. He had been bitten in Madagascar during holiday with his family in January. Nobody saw the dog which bit, but the family members thought it was one of the known stray dogs. The child did not receive any PET as the dog was thought to be still alive until 3 weeks after the bite. Back home, the boy died within one week showing anxiety, agitation and hydrophobia. Rabies virus antigen was found on brain and skin biopsies. 299 PET's were applied to hospital staff, family members and playmates of the child.

Case 3

A 71 year old man was bitten in Algeria by his own dog in his village while on vacation. He did not seek any PET treatment. He died 40 days later, back in France. Hydrophobia had been reported before death. Rabies antigen was found on brain and skin biopsies. A woman bitten by the same dog died in Algeria at the same time. 35 PET's were applied to close contacts.

Case 4

A 60 year old man was bitten in Algeria. He died 2 months later, when he was back in France. Hydrophobia was present. Rabies antigen was found on brain biopsies. 45 PET's were applied to family members and hospital staff.

Case 5

A 50 year old woman was bitten by a rabid dog during a holiday trip in India. The wounds were deep and multiple, located on the legs. The wounds were cleaned and sutured on the same day at the local hospital and she received one dose of rabies vaccine intramuscularly (PCEC, Behring). The second dose was given 3 days later in India. Back in France, she received 3 more doses of Verorab according to the Essen schedule. 12 days after the bite, she began to complain of paresthesia at the site of the wounds. She developed a paralytic form of rabies and died 50 days after the bite. 50 PET's were applied in family members and hospital staff. Rabies virus antigen was found *intra-vitam* on skin biopsy and *post-mortem* on brain biopsies. Rabies virus RNA was found *intra-vitam* in the saliva by RT-PCR.

Rabies is no doubt a danger for travellers, especially for European travellers who have forgotten that there can be risk of rabid animals. Information on rabies should be part of the pre-travel preparation given in travel clinics as well as by general practitioners. Moreover, cell culture or duck embryo rabies vaccines and rabies immunoglobulin are not readily available everywhere. Rabies preexposure vaccination is therefore useful for residents in canine rabies enzootic countries, as well as for children and for travellers in remote areas. Rabies PET in previously vaccinated individuals is greatly simplified. Two vaccine injections are given 3 days apart. No rabies immunoglobulin is necessary. An anamnestic response is elicited and high antibody titers are rapidly obtained.

TABLE 5.1

EUR EUROPE 4/97 RABIES CASES 1.10.97 - 31.12.97

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		
ALB	ALBANIA *							0						0		0
AUT	AUSTRIA *							0						0		0
BEL	BELGIUM	-	-	2	-	-	-	2						0		2
BIH	BOSNA I HERCEGOW.**							0						0		0
BUL	BULGARIA							0	-	-	-	-	1	1		1
BYE	BELARUS 1)	2	-	1	-	-	-	3	-	-	-	-	7	7		10
CRO	CROATIA	-	5	1	-	2	-	8	115	3	-	-	1	119		127
CZH	CZECH REPUBLIC							0	32	-	-	1	-	33		33
DEN	DENMARK							0	-	-	-	-	1	1		1
DEU	FED.REP. OF GERMANY	-	-	-	-	1	-	1	23	-	-	-	1	24		25
EST	ESTONIA	2	1	4	-	1	-	8	10	-	-	-	15	25		33
FIN	FINLAND *							0						0		0
FRA	FRANCE							0	1	-	-	-	-	1		1
FRY	FED.REP.OF YUGOSLAVI	2	2	-	-	-	-	4	16	-	-	-	-	16		20
GRE	GREECE *							0						0		0
HUN	HUNGARY	2	24	7	1	1	-	35	138	-	-	1	-	139		174
ICE	ICELAND *							0						0		0
IRE	IRELAND *							0						0		0
ITA	ITALY *							0						0		0
LTU	LITHUANIA	3	7	35	3	-	-	48	16	-	9	-	13	38		86
LUX	LUXEMBOURG							0	1	-	-	-	-	1		1
LVA	LATVIA	6	3	2	-	-	-	11	7	1	-	-	4	12		23
MLD	MOLDOVA	-	2	5	-	-	-	7	3	-	-	-	-	3		10
NET	NETHERLANDS							0	-	-	-	-	4	4		4
NOR	NORWAY *							0						0		0
POL	POLAND	11	24	45	1	1	1	83	213	1	6	1	29	250		333
POR	PORTUGAL *							0						0		0
ROM	ROMANIA	2	1	2	-	-	-	5	2	1	-	-	-	3		8
RUS	RUSSIAN FEDERATION	70	52	129	5	6	2	264	153	-	3	-	8	164	2	430
SPA	SPAIN 2)	1	-	-	-	-	-	1						0		1
SVK	SLOVAK REPUBLIC	1	5	1	-	-	-	7	51	1	1	-	2	55		62
SVN	SLOVENIA							0	2	-	-	-	-	2		2
SWE	SWEDEN *							0						0		0
SWI	SWITZERLAND + LIE.3)	1	-	-	-	-	-	1						0		1
TUR	TURKEY	27	-	5	-	1	-	33						0		33
TYM	MAKEDONIJA *							0						0		0
UKR	UKRAINE **							0						0		0
UNK	UNITED KINGDOM *							0						0		0
TOTAL		130	126	239	10	13	3	521	783	7	19	3	86	898	2	1421
PER CENT		9.1	8.9	16.8	0.7	0.9	0.2	36.7	55.1	0.5	1.3	0.2	6.1	63.2	0.1	100.0

* NO CASES ** NO DATA 1) NO DATA FOR OKTOBER 1997 2) NORTH AFRICA 3) 1 DOG IMPORTED FROM MOROCCO

TABLE 5.2

EUR EUROPE 1997 RABIES CASES 1. 1.97 - 31.12.97

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		
ALB	ALBANIA *							0						0		0
AUT	AUSTRIA	-	-	1	-	-	-	1	7	-	-	-	-	7		8
BEL	BELGIUM	-	-	3	-	-	-	3	5	-	1	-	-	6		9
BIH	BOSNA I HERCEGOW.**							0						0		0
BUL	BULGARIA	1	-	-	1	-	1	3	-	-	-	-	12	12		15
BYE	BELARUS 1)	13	3	2	-	-	-	18	-	-	-	-	44	44		62
CRO	CROATIA	9	16	11	1	5	1	43	373	5	1	1	6	386		429
CZH	CZECH REPUBLIC	-	6	-	-	-	-	6	224	1	4	3	-	232		238
DEN	DENMARK							0	-	-	-	-	8	8		8
DEU	FED.REP. OF GERMANY	-	1	5	-	2	-	8	74	-	-	1	3	78		86
EST	ESTONIA	12	8	9	-	2	-	31	73	1	-	-	45	119		150
FIN	FINLAND *							0						0		0
FRA	FRANCE 2)							0	1	-	-	-	1	2	1	3
FRY	FED.REP.OF YUGOSLAVI	15	13	1	-	2	-	31	67	-	-	-	-	67		98
GRE	GREECE *							0						0		0
HUN	HUNGARY	20	65	23	1	3	1	113	445	-	5	7	1	458		571
ICE	ICELAND *							0						0		0
IRE	IRELAND *							0						0		0
ITA	ITALY *							0						0		0
LTU	LITHUANIA	8	18	70	4	-	-	100	43	-	15	-	21	79	1	180
LUX	LUXEMBOURG							0	2	-	-	-	-	2		2
LVA	LATVIA	21	8	7	-	-	-	36	78	3	2	-	22	105		141
MLD	MOLDOVA	3	4	7	-	1	-	15	7	-	-	-	-	7		22
NET	NETHERLANDS							0	-	-	-	-	13	13		13
NOR	NORWAY *							0						0		0
POL	POLAND	58	88	102	4	1	2	255	1092	9	39	11	89	1240		1495
POR	PORTUGAL *							0						0		0
ROM	ROMANIA	7	4	4	3	-	-	18	13	1	1	-	1	16		34
RUS	RUSSIAN FEDERATION	293	143	260	12	27	6	741	298	1	4	1	21	325	10	1076
SPA	SPAIN 3)	4	-	-	1	-	-	5						0		5
SVK	SLOVAK REPUBLIC	19	30	2	-	-	1	52	198	1	4	-	4	207		259
SVN	SLOVENIA	1	6	1	-	-	-	8	18	-	3	-	-	21		29
SWE	SWEDEN *							0						0		0
SWI	SWITZERLAND + LIE.4)	1	-	-	-	-	-	1						0		1
TUR	TURKEY	117	6	13	-	1	1	138	1	-	-	-	3	4		142
TYM	MAKEDONIJA *							0						0		0
UKR	UKRAINE **							0						0		0
UNK	UNITED KINGDOM *							0						0		0
TOTAL		602	419	521	27	44	13	1626	3019	22	79	24	294	3438	12	5076
PER CENT		11.9	8.3	10.3	0.5	0.9	0.3	32.0	59.5	0.4	1.6	0.5	5.8	67.7	0.2	100.0

* NO CASES ** NO DATA 1) NO DATA FOR JUNE - OKTOBER 2) 1 HUMAN CASE IMPORTED FROM INDIA
3) NORTH AFRICA 4) 1 DOG IMPORTED FROM MOROCCO

TABLE 5.3

EUR EUROPE 4/97 RABIES CASES 'OTHER ANIMAL SPECIES' 1.10.97 - 31.12.97

LOCATION		OTHER DOMESTIC ANIMALS		OTHER WILD ANIMALS								UNSPECI-FIED	TOTAL
CODE	NAME	OTHER DOMESTIC CARNIVORES	PIG	WOLF	RACCOON DOG	WILD CAT	RACCOON	INSECTIV. BATS	SQUIRREL	BLACK RAT	OTHERS		
BUL	BULGARIA	-	-	-	-	-	-	-	-	-	-	1	1
BYE	BELARUS	-	-	-	-	-	-	-	-	-	7	-	7
CRO	CROATIA	-	-	1	-	-	-	-	-	-	-	-	1
DEN	DENMARK	-	-	-	-	-	-	1	-	-	-	-	1
DEU	FED.REP. OF GERMANY	-	-	-	-	-	-	1	-	-	-	-	1
EST	ESTONIA	-	-	-	6	-	8	-	1	-	-	-	15
LTU	LITHUANIA	-	-	-	13	-	-	-	-	-	-	-	13
LVA	LATVIA	-	-	-	4	-	-	-	-	-	-	-	4
NET	NETHERLANDS	-	-	-	-	-	-	4	-	-	-	-	4
POL	POLAND	1	-	-	29	-	-	-	-	-	-	-	30
RUS	RUSSIAN FEDERATION	-	2	2	5	-	-	-	-	1	-	-	10
SVK	SLOVAK REPUBLIC	-	-	-	-	1	-	-	-	1	-	-	2
TOTAL		1	2	3	57	1	8	6	1	2	7	1	89
PER CENT		1.1	2.2	3.4	64.0	1.1	9.0	6.7	1.1	2.2	7.9	1.1	100.0

TABLE 5.4

EUR EUROPE 1997 RABIES CASES 'OTHER ANIMAL SPECIES' 1.01.97 - 31.12.97

COUNTRY	OTHER DOMESTIC ANIMALS						OTHER WILD ANIMALS												UNSPECI-FIED	TOTAL
	OTH.DOM. CARNIVOR	DONKEY	PIG	OTH.DOM. HERBIVOR	DOMESIC RABBIT	DOG LIV. WILD	WOLF	RACCOON DOG	WILD CAT	LYNX	RACCOON	WILDBOAR	INS.BAT	SQUIRREL	BEAVER	BLACK RAT	HOUSE MOUSE	OTH.SM. RODENTS	OTHERS		
BUL	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	12	13
BYE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44	-	44
CRO	-	1	-	-	-	-	3	-	2	-	-	1	-	-	-	-	-	-	-	-	7
DEN	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	8
DEU	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3
EST	-	-	-	-	-	-	-	36	-	-	8	-	-	1	-	-	-	-	-	-	45
FRA	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
HUN	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
LTU	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	21
LVA	-	-	-	-	-	-	1	20	-	1	-	-	-	-	-	-	-	-	-	-	22
NET	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	13
POL	2	-	-	-	-	-	-	89	-	-	-	-	-	-	-	-	-	-	-	-	91
ROM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
RUS	-	-	3	3	-	-	7	10	-	-	-	-	-	-	1	2	-	1	-	-	27
SVK	-	-	-	-	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	5
TUR	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	4
TOT	2	2	4	3	1	1	13	176	6	1	8	1	25	1	1	3	1	1	45	12	307
PER	0.7	0.7	1.3	1.0	0.3	0.3	4.2	57.3	2.0	0.3	2.6	0.3	8.1	0.3	0.3	1.0	0.3	0.3	14.7	3.9	100.0

RABIES CASES															1.10.97 - 31.12.97
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															
LX LUXEMBOURG	-	-	2	-	-	-	2						0		2
TOTAL	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2
DEN DENMARK															
025 ROSKILDE							0	-	-	-	-	1	1		1
TOTAL	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
DEU FEDERAL REPUBLIC OF GERMANY															
05 NORDRHEIN-WESTFALEN	-	-	-	-	1	-	1	13	-	-	-	-	13		14
06 HESSEN							0	4	-	-	-	-	4		4
07 RHEINLAND-PFALZ							0	3	-	-	-	-	3		3
10 SAARLAND							0	3	-	-	-	-	3		3
15 Sachsen-Anhalt							0	-	-	-	-	1	1		1
TOTAL	0	0	0	0	1	0	1	23	0	0	0	1	24	0	25
PER CENT	0.0	0.0	0.0	0.0	4.0	0.0	4.0	92.0	0.0	0.0	0.0	4.0	96.0	0.0	100.0
LUX LUXEMBOURG															
13 REMICH							0	1	-	-	-	-	1		1
TOTAL	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1

RABIES CASES 1.10.97 - 31.12.97																
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		
BUL BULGARIA															
08 DOBRICH							0	-	-	-	-	1	1		1
TOTAL	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
FRY FED.REP.OF YUGOSLAVIA															
20 SR CRNA GORA							0	2	-	-	-	-	2		2
60 SR SRBIJA	1	2	-	-	-	-	3	7	-	-	-	-	7		10
61 SAP VOJVODINA	1	-	-	-	-	-	1	7	-	-	-	-	7		8
TOTAL	2	2	0	0	0	0	4	16	0	0	0	0	16	0	20
PER CENT	10.0	10.0	0.0	0.0	0.0	0.0	20.0	80.0	0.0	0.0	0.0	0.0	80.0	0.0	100.0
TUR TURKEY															
03 AFYON	1	-	-	-	-	-	1						0		1
09 AYDIN	1	-	-	-	-	-	1						0		1
16 BURSA	3	-	-	-	-	-	3						0		3
21 DIYARBAKIR	1	-	-	-	-	-	1						0		1
26 ESKISEHIR	1	-	-	-	-	-	1						0		1
31 HATAY	1	-	1	-	-	-	2						0		2
32 ISPARTA	1	-	-	-	-	-	1						0		1
34 ISTANBUL	6	-	1	-	-	-	7						0		7
35 IZMIR	5	-	-	-	-	-	5						0		5
37 KASTAMONU	1	-	2	-	-	-	3						0		3
45 MANISA	4	-	-	-	-	-	4						0		4
46 KAHRAMANMARAS	1	-	-	-	-	-	1						0		1
52 ORDU	1	-	-	-	-	-	1						0		1
63 SANLIURFA	-	-	1	-	1	-	2						0		2
TOTAL	27	0	5	0	1	0	33	0	0	0	0	0	0	0	33
PER CENT	81.8	0.0	15.2	0.0	3.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

RABIES CASES 1.10.97 - 31.12.97

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		
BYE	**BELARUS**															
02	Vitebsk Region	-	-	1	-	-	-	1	-	-	-	-	1	1		2
03	Gomel Region							0	-	-	-	-	2	2		2
04	Grodno Region	1	-	-	-	-	-	1						0		1
05	Minsk Region	1	-	-	-	-	-	1	-	-	-	-	4	4		5
TOTAL		2	0	1	0	0	0	3	0	0	0	0	7	7	0	10
PER CENT		20.0	0.0	10.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	70.0	70.0	0.0	100.0
MLD	**MOLDOVA**															
01	MOLDOVA	-	2	5	-	-	-	7	3	-	-	-	-	3		10
TOTAL		0	2	5	0	0	0	7	3	0	0	0	0	3	0	10
ROM	**ROMANIA**															
06	BISTRITA-NASAUD							0	1	-	-	-	-	1		1
22	HUNEDOARA	-	1	-	-	-	-	1						0		1
28	NEAMT	1	-	2	-	-	-	3						0		3
34	SUCEAVA							0	1	1	-	-	-	2		2
40	VRANCEA	1	-	-	-	-	-	1						0		1
TOTAL		2	1	2	0	0	0	5	2	1	0	0	0	3	0	8
PER CENT		25.0	12.5	25.0	0.0	0.0	0.0	62.5	25.0	12.5	0.0	0.0	0.0	37.5	0.0	100.0

BELARUS NO DATA FOR OKTOBER 1997

CRO CROATIA RABIES CASES 1.10.97 - 31.12.97

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		
002	BENKOVAC							0	11	-	-	-	-	11		11
004	BJELOVAR	-	1	-	-	-	-	1	6	-	-	-	-	6		7
007	BUZET							0	1	-	-	-	-	1		1
013	DARUVAR							0	1	-	-	-	-	1		1
014	DELNICE							0	2	-	-	-	-	2		2
015	DONJA STUBICA							0	4	-	-	-	-	4		4
017	DONJI MIHOLJAC							0	1	-	-	-	-	1		1
018	DRNIS							0	2	-	-	-	-	2		2
020	DUGA RESA							0	1	-	-	-	-	1		1
021	DUGO SELO							0	2	-	-	-	-	2		2
023	DAKOVO							0	1	-	-	-	-	1		1
024	DURDEVAC							0	3	-	-	-	-	3		3
025	GARESNICA							0	2	-	-	-	-	2		2
033	IVANIC GRAD							0	1	-	-	-	-	1		1
034	JASTREBARSKO							0	2	-	-	-	-	2		2
040	KOPRIVNICA							0	1	-	-	-	-	1		1
042	KOSTAJNICA							0	1	-	-	-	-	1		1
044	KRIZEVCI	-	-	1	-	-	-	1	9	1	-	-	-	10		11
046	KUTINA							0	3	-	-	-	-	3		3
050	MAKARSKA							0	2	1	-	-	-	3		3
053	NOVA GRADISKA							0	1	-	-	-	-	1		1
054	NOVI MAROF							0	1	-	-	-	-	1		1
056	OBROVAC	-	-	-	-	1	-	1						0		1
057	OGULIN							0	1	-	-	-	-	1		1
073	RIJEKA							0	1	-	-	-	-	1		1
078	POZEGA	-	-	-	-	1	-	1	3	-	-	-	-	3		4
079	SLAVONSKI BROD							0	3	-	-	-	-	3		3
086	VALPOVO							0	1	-	-	-	-	1		1
087	VARAZDIN							0	2	-	-	-	-	2		2
088	VINKOVCI							0	3	1	-	-	-	4		4
092	VRBOVEC	-	2	-	-	-	-	2	19	-	-	-	-	19		21
095	VRGORAC							0	-	-	-	-	1	1		1
098	ZADAR	-	1	-	-	-	-	1						0		1
099	SVETI IVAN ZELINA							0	4	-	-	-	-	4		4
100	ZLATAR BISTRICA							0	3	-	-	-	-	3		3
101	ZUPANJA							0	6	-	-	-	-	6		6
102	GRAD ZAGREB	-	1	-	-	-	-	1	11	-	-	-	-	11		12
TOTAL		0	5	1	0	2	0	8	115	3	0	0	1	119	0	127
PER CENT		0.0	3.9	0.8	0.0	1.6	0.0	6.3	90.6	2.4	0.0	0.0	0.8	93.7	0.0	100.0

RABIES CASES															1.10.97 - 31.12.97
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		
CZH CZECH REPUBLIC															
01 Central Bohemia							0	16	-	-	1	-	17		17
02 South Bohemia							0	6	-	-	-	-	6		6
04 North Bohemia							0	4	-	-	-	-	4		4
06 South Moravia							0	6	-	-	-	-	6		6
TOTAL	0	0	0	0	0	0	0	32	0	0	1	0	33	0	33
PER CENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.0	0.0	0.0	3.0	0.0	100.0	0.0	100.0
SVK SLOVAK REPUBLIC															
1 Bratislavsky kraj							0	15	-	-	-	-	15		15
2 Trnavsky kraj	-	1	-	-	-	-	1	2	-	-	-	-	2		3
3 Trenciansky kraj							0	1	-	-	-	-	1		1
5 Zilinsky kraj							0	3	-	-	-	-	3		3
6 Banskobystricky kraj							0	9	-	-	-	-	9		9
7 Presovsky kraj	1	3	1	-	-	-	5	9	-	1	-	2	12		17
8 Kosicky kraj	-	1	-	-	-	-	1	12	1	-	-	-	13		14
TOTAL	1	5	1	0	0	0	7	51	1	1	0	2	55	0	62
PER CENT	1.6	8.1	1.6	0.0	0.0	0.0	11.3	82.3	1.6	1.6	0.0	3.2	88.7	0.0	100.0

RABIES CASES 1.10.97 - 31.12.97

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		
EST ESTONIA															
01 Harjumaa							0	2	-	-	-	2	4		4
03 Ida-Virumaa							0	1	-	-	-	-	1		1
05 Jaervamaa							0	-	-	-	-	2	2		2
07 Laeaene-Virumaa							0	4	-	-	-	-	4		4
08 Polvamaa							0	-	-	-	-	3	3		3
09 Paernumaa	-	-	1	-	-	-	1						0		1
10 Raplamaa	1	-	2	-	-	-	3	1	-	-	-	4	5		8
11 Saaremaa	-	1	-	-	1	-	2	-	-	-	-	1	1		3
13 Valgamaa							0	-	-	-	-	1	1		1
14 Viljandimaa	-	-	1	-	-	-	1	1	-	-	-	-	1		2
15 Vorumaa	1	-	-	-	-	-	1	1	-	-	-	2	3		4
TOTAL	2	1	4	0	1	0	8	10	0	0	0	15	25	0	33
PER CENT	6.1	3.0	12.1	0.0	3.0	0.0	24.2	30.3	0.0	0.0	0.0	45.5	75.8	0.0	100.0
LVA LATVIA															
01 Aizkraukle							0	1	-	-	-	-	1		1
02 Aluksne							0	-	-	-	-	1	1		1
03 Balvi	1	-	-	-	-	-	1						0		1
10 Jelgava	-	1	-	-	-	-	1						0		1
11 Kraslava	1	-	-	-	-	-	1						0		1
13 Liepaja							0	-	1	-	-	-	1		1
14 Limbazi							0	1	-	-	-	-	1		1
15 Ludza	-	1	-	-	-	-	1						0		1
17 Ogre	1	-	1	-	-	-	2	1	-	-	-	-	1		3
20 Riga	1	1	-	-	-	-	2	1	-	-	-	1	2		4
21 Saldus	1	-	-	-	-	-	1	3	-	-	-	1	4		5
22 Talsi	1	-	-	-	-	-	1						0		1
25 Valmiera	-	-	1	-	-	-	1						0		1
26 Ventspils							0	-	-	-	-	1	1		1
TOTAL	6	3	2	0	0	0	11	7	1	0	0	4	12	0	23
PER CENT	26.1	13.0	8.7	0.0	0.0	0.0	47.8	30.4	4.3	0.0	0.0	17.4	52.2	0.0	100.0

RABIES CASES

1.10.97 - 31.12.97

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		
FRA	FRANCE															
57	MOSELLE							0	1	-	-	-	-	1		1
TOTAL		0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
NET	NETHERLANDS															
01	DRENTHE							0	-	-	-	-	2	2		2
02	FRIESLAND							0	-	-	-	-	1	1		1
10	ZUID-HOLLAND							0	-	-	-	-	1	1		1
TOTAL		0	0	0	0	0	0	0	0	0	0	0	4	4	0	4
SPA	SPAIN															
52	MELILLA (NORTH AFRICA)	1	-	-	-	-	-	1						0		1
TOTAL		1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
SWI	SWITZERLAND AND LIECHTENSTEIN															
250131	ADLISWIL	1	-	-	-	-	-	1						0		1
TOTAL		1	0	0	0	0	0	1	0	0	0	0	0	0	0	1

SWITZERLAND IMPORTED 1 CASE FROM MOROCCO

R A B I E S C A S E S 1.10.97 - 31.12.97

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		
HUN HUNGARY															
01 Budapest							0	3	-	-	-	-	3		3
02 BARANYA	-	4	-	-	-	-	4	8	-	-	-	-	8		12
03 Bacs-Kiskun	1	2	1	-	-	-	4	11	-	-	-	-	11		15
04 Bekes							0	9	-	-	1	-	10		10
05 Borsod-Abauj-Zemplen	-	4	1	-	1	-	6	15	-	-	-	-	15		21
06 Csongrad	1	3	-	-	-	-	4	13	-	-	-	-	13		17
07 Fejer	-	-	-	1	-	-	1	3	-	-	-	-	3		4
09 Hajdu-Bihar							0	11	-	-	-	-	11		11
10 Heves							0	9	-	-	-	-	9		9
11 Komarom	-	2	-	-	-	-	2	2	-	-	-	-	2		4
12 Nograd							0	13	-	-	-	-	13		13
13 Pest	-	1	1	-	-	-	2	14	-	-	-	-	14		16
14 Somogy	-	4	-	-	-	-	4	3	-	-	-	-	3		7
15 Szabolcs-Szat							0	6	-	-	-	-	6		6
16 Szolnok	-	2	4	-	-	-	6	9	-	-	-	-	9		15
17 Tolna	-	2	-	-	-	-	2	4	-	-	-	-	4		6
18 Vas							0	2	-	-	-	-	2		2
20 Zala							0	3	-	-	-	-	3		3
TOTAL	2	24	7	1	1	0	35	138	0	0	1	0	139	0	174
PER CENT	1.1	13.8	4.0	0.6	0.6	0.0	20.1	79.3	0.0	0.0	0.6	0.0	79.9	0.0	100.0
SVN SLOVENIA															
023 DOMZALE							0	1	-	-	-	-	1		1
048 KOCEVJE							0	1	-	-	-	-	1		1
TOTAL	0	0	0	0	0	0	0	2	0	0	0	0	2	0	2
PER CENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0

LTU LITHUANIA RABIES CASES 1.10.97 - 31.12.97

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		
36	Birzu	-	-	5	-	-	-	5	1	-	-	-	-	1		6
43	Zarasu							0	-	-	-	-	1	1		1
47	Joniskio	-	1	2	-	-	-	3						0		3
52	Kauno	-	-	1	-	-	-	1	1	-	-	-	-	1		2
53	Kedainiai	-	-	1	-	-	-	1						0		1
54	Kelmes	-	-	1	-	-	-	1	1	-	-	-	-	1		2
55	Klaipedos	1	1	3	-	-	-	5						0		5
62	Moletu	-	-	2	2	-	-	4	-	-	-	-	1	1		5
65	Pakruojo	-	1	2	-	-	-	3	-	-	3	-	1	4		7
66	Panevezio							0	-	-	-	-	1	1		1
67	Pasvalio	-	2	-	-	-	-	2	3	-	-	-	-	3		5
68	Plunges							0	-	-	1	-	-	1		1
72	Raseiniai	-	-	1	-	-	-	1						0		1
75	Skuodo	-	1	-	-	-	-	1	1	-	-	-	-	1		2
77	Taurages	-	-	3	1	-	-	4	4	-	-	-	2	6		10
78	Telsiu	1	-	-	-	-	-	1	1	-	-	-	-	1		2
81	Ukmerges							0	1	-	-	-	-	1		1
82	Utenos	1	-	2	-	-	-	3	-	-	1	-	2	3		6
84	Sakiu	-	1	2	-	-	-	3	1	-	1	-	-	2		5
86	Svencioniu							0	-	-	-	-	1	1		1
87	Silales	-	-	5	-	-	-	5						0		5
88	Silutes	-	-	3	-	-	-	3	2	-	3	-	-	5		8
89	Sirvintu							0	-	-	-	-	2	2		2
91	Siauliu							0	-	-	-	-	1	1		1
94	Jurbarko	-	-	2	-	-	-	2	-	-	-	-	1	1		3
TOTAL		3	7	35	3	0	0	48	16	0	9	0	13	38	0	86
PER CENT		3.5	8.1	40.7	3.5	0.0	0.0	55.8	18.6	0.0	10.5	0.0	15.1	44.2	0.0	100.0

POL POLAND — RABIES CASES — 1.10.97 - 31.12.97

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	-	-	-	-	-	1	1	3	-	1	-	-	4		5
03	BIALA PODLASKA							0	16	-	-	-	-	16		16
05	BIALYSTOK	-	-	2	-	-	-	2	20	-	-	-	1	21		23
07	BIELSKO-BIALA							0	1	-	-	-	-	1		1
09	BYDGOSZCZ							0	-	-	-	-	3	3		3
13	CIECHANOW	1	-	1	-	-	-	2	6	-	-	-	2	8		10
15	CZESTOCHOWA							0	1	-	-	-	-	1		1
17	ELBLAG	-	3	7	-	-	-	10	2	-	-	-	2	4		14
25	KALISZ							0	3	-	2	1	-	6		6
29	KIELCE	-	1	-	-	-	-	1	12	-	-	-	-	12		13
31	KONIN							0	2	-	-	-	-	2		2
35	KRAKOW	1	2	-	-	-	-	3	12	-	-	-	-	12		15
43	LUBLIN							0	12	-	-	-	3	15		15
45	LOMZA	2	1	2	-	-	-	5	9	1	-	-	1	11		16
47	LODZ	1	-	-	-	-	-	1	1	-	-	-	-	1		2
49	NOWY SACZ	-	2	-	-	1	-	3	1	-	-	-	-	1		4
51	OLSZTYN	1	-	15	1	-	-	17	12	-	2	-	8	22		39
53	OPOLE	-	1	-	-	-	-	1						0		1
55	OSTROLEKA	1	1	3	-	-	-	5	16	-	1	-	2	19		24
59	PIOTRKOW TRYB							0	3	-	-	-	-	3		3
61	PLOCK							0	4	-	-	-	1	5		5
65	PRZEMYSL	-	1	-	-	-	-	1	6	-	-	-	-	6		7
67	RADOM							0	3	-	-	-	-	3		3
69	RZESZOW	2	3	-	-	-	-	5	16	-	-	-	-	16		21
71	SIEDLCE	-	1	1	-	-	-	2	12	-	-	-	-	12		14
75	SKIERNIEWICE							0	2	-	-	-	-	2		2
79	SUWALKI	1	6	10	-	-	-	17	5	-	-	-	2	7		24
83	TARNOBRZEG	-	1	-	-	-	-	1	14	-	-	-	1	15		16
85	TARNOW	1	-	-	-	-	-	1	1	-	-	-	1	2		3
87	TORUN	-	1	4	-	-	-	5	9	-	-	-	2	11		16
91	WLOCLAWEK							0	2	-	-	-	-	2		2
95	ZAMOSC							0	7	-	-	-	-	7		7
TOTAL		11	24	45	1	1	1	83	213	1	6	1	29	250	0	333
PER CENT		3.3	7.2	13.5	0.3	0.3	0.3	24.9	64.0	0.3	1.8	0.3	8.7	75.1	0.0	100.0

RUS RUSSIAN FEDERATION	RABIES CASES													1.10.97 - 31.12.97	
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		
08 Pskov Region	1	2	9	2	-	-	14	9	-	-	-	2	11		25
12 Twer Region							0	7	-	-	-	3	10	1	11
13 Kaluga Region	2	2	1	-	-	1	6	19	-	-	-	-	19		25
15 Moscow Region	1	2	-	-	-	-	3	6	-	-	-	-	6		9
16 Oryol Region							0	2	-	-	-	-	2		2
17 Ruazan Region	2	-	-	-	-	-	2						0		2
18 Smolensk Region	1	-	-	-	-	-	1	7	-	-	-	1	8		9
19 Tula Region	6	3	-	-	1	-	10	4	-	2	-	-	6		16
26 Belgorod Region	5	7	17	-	-	-	29	14	-	1	-	-	15		44
27 Voronezh Region	6	4	17	-	-	-	27	9	-	-	-	-	9		36
28 Kursk Region	6	12	27	2	1	-	48	29	-	-	-	-	29		77
29 Lipetsk Region							0	2	-	-	-	-	2		2
31 Astrakhan Region	1	3	8	-	1	-	13						0		13
32 Volgograd Region	4	2	11	-	-	-	17	3	-	-	-	-	3		20
33 Samara Region	-	-	2	-	-	-	2	3	-	-	-	-	3		5
34 Penza Region							0	9	-	-	-	-	9		9
35 Saratov Region	1	-	2	-	-	-	3	1	-	-	-	1	2		5
36 Ulyanovsk Region	3	1	-	-	1	-	5						0		5
37 Rep. of Kalmykiya	2	-	2	-	2	1	7						0		7
38 Rep. of Tatarstan	1	3	1	-	-	-	5	14	-	-	-	-	14		19
39 Krasnodar Territory	5	-	-	-	-	-	5	1	-	-	-	-	1	1	7
40 Stavropol Territory	2	-	10	-	-	-	12						0		12
41 Rostov Region	5	3	7	-	-	-	15	8	-	-	-	1	9		24
42 Orenburg Region	5	2	6	1	-	-	14	3	-	-	-	-	3		17
44 Rep. of Bashkortostan	11	5	9	-	-	-	25	3	-	-	-	-	3		28
45 Rep. of Odmurtiya	-	1	-	-	-	-	1						0		1
TOTAL	70	52	129	5	6	2	264	153	0	3	0	8	164	2	430
PER CENT	16.3	12.1	30.0	1.2	1.4	0.5	61.4	35.6	0.0	0.7	0.0	1.9	38.1	0.5	100.0

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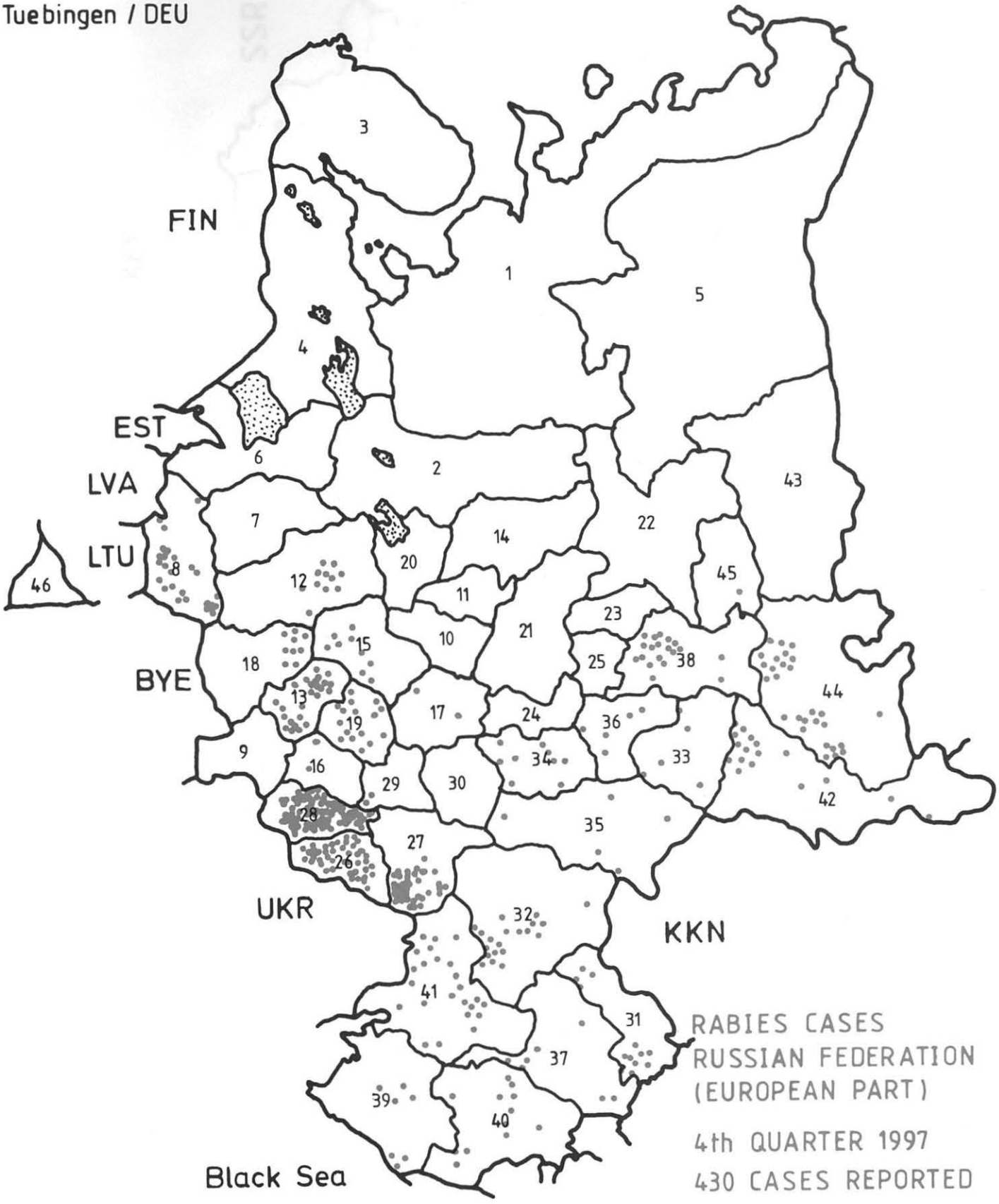

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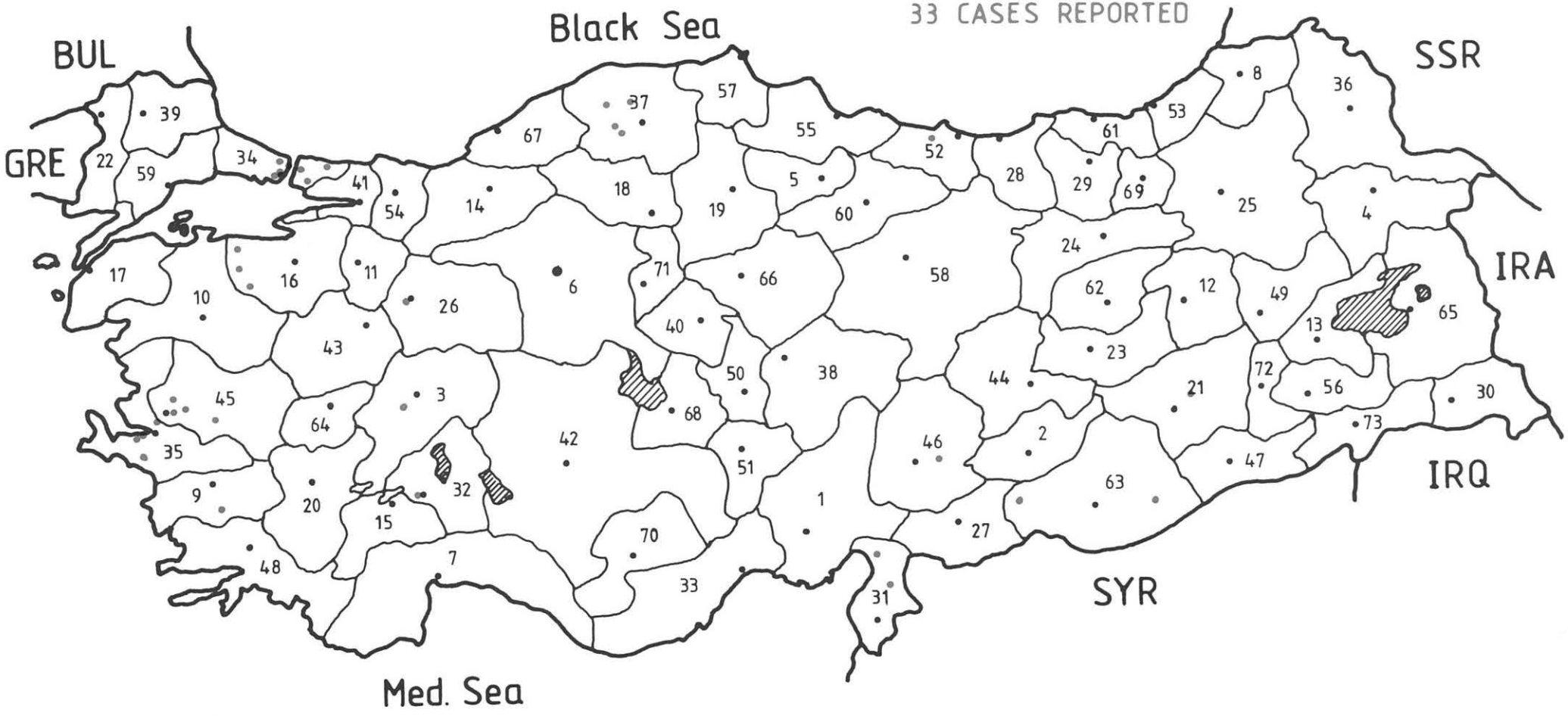
RABIES CASES TURKEY
4th QUARTER 1997
33 CASES REPORTED



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RABIES CASES EUROPE
4th QUARTER 1997

1421 CASES REPORTED
6 BAT RABIES CASES INCLUDED

ICE
(rabies free)

NOR
(rabies free)

FIN
(rabies free)

SWE
(rabies free)

EST
(33)

LVA
(23)

RUS
(430)

DEN
(1)

LTU
(86)

RUS

BYE
(10)

IRE
(rabies free)

UNK
(0)

NET
(4)

POL
(333)

UKR
(no data)

DEU
(24)
(1)

BEL
(2)

(1)

CZH
(33)

SVK
(62)

MLD
(10)

FRA
(1)

AUT
(0)

HUN
(174)

(1)
(DOG CASE IMPORTED
FROM MOROCCO)

SWI

ROM
(8)

SVN
(2)

CRO
(127)

ITA
(rabies free)

BIH
(no data)

FRY
(20)

BUL
(1)

TYM
(rabies free)

POR
(rabies free)

SPA
(MAINLAND AND ISLANDS RABIES FREE)

NORTH AFRICA
(1)

ALB
(rabies free)

TUR
(33)

GRE
(rabies free)

0 50 100 km

(rabies free) = NO INDIGENOUS CASE REPORTED FOR AT LEAST TWO YEARS