Eradication: Final report for Rabies 2018

For each approved annual or multi-annual programme Member States shall submit to the Commission by the 30 April each year an annual detailed technical and financial report covering the previous year. That report shall include the results achieved and a detailed account of eligible costs incurred (Art 14 of Regulation (EU) No 652/2014).

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Reporting period

From: 2017 **To:** 2019 **Year of implementation:** 2018

1. Technical implementation of the programme

1.1 Description and evaluation of the evolution of the epidemiological situation, the technical implementation of the activities foreseen under the programme and the cost-effectiveness of the programme.

Oral vaccination of red foxes was first performed in 1992 in the western part of Hungary, then the vaccination area was gradually increased. The whole territory of the country was vaccinated between 2005 and 2007, and this resulted in a drastic decrease in the number of rabies cases. The vaccination programme is co-financed by the EU since 2007. Between 2008 and spring 2013 a 50 km wide buffer zone along the southern and eastern country border was vaccinated.
After two consecutive years when rabies was detected only in bats (2011 and 2012), a rabid fox was found in Kecskemét (Bács-Kiskun county) in September 2013. Until end of 2013, altogether 24 rabies cases were confirmed (22 foxes, 2 cattle). All the cases were confirmed in the central area of the country, not vaccinated since 2008. In response to the epidemiological situation, CA ordered an emergency ring vaccination in the area of a 50 km radius circle around the first case, along with the 2013 autumn vaccination campaign. In 2014, vaccination area was extended to the north until M3 highway, in the infected area double bait density was applied (40 baits/km2). 23 rabies cases were detected in 2014 (1 roe deer, 20 foxes, 1 goat and 1 dog). In 2015 no rabies cases were found in Hungary (only one bat and one fox was found positive, the latter proved to be a vaccine induced case, confirmed by the EURL as well). The vaccination area was extended to all the northern territories of Hungary east of the Danube in 2015 according to the request of the European Commission. The same area of 66.884 km2 was vaccinated in 2016 and 2017.

In February 2016 rabies was confirmed in the laboratory of the Veterinary Diagnostic Directorate (NRL) of the National Food Chain Safety Office of Hungary, from a red fox originating from Szerencs, Borsod-Abaúj-Zemplén county (north-eastern part of Hungary). The virus strain isolated from the sample was different from the strain detected during the 2013-2014 rabies epidemic in Hungary. The case occurred within the vaccination area. During the spring vaccination campaign oral vaccination was performed with 500 m flight line distance and double baiting density (40 baits/km2) within the area of a 50 km radius-circle around the outbreak. In March 2017, in the same area, a red fox showing neurological symptoms was found positive again. The strain was identical to the one isolated in 2016. Two weeks later, in a farm closely located to the finding place of the fox, rabies was confirmed in two goats (a female and a kid).
During the year 2018, no classical rabies cases were detected in Hungary (only EBLV in bats: one case of only EBLV-1, Pest county, January 2018), and two vaccine distribution campaigns were performed.

In spring 2018, due to problems with the public procurement procedure, vaccination campaign could not be performed in the area of Hungary that was designated for vaccination in the plan submitted for 2018 (the European Commission has been notified about the problem in letter No ÉlfF/268/2018 of 14 March 2018). However, taking into consideration the epidemiological risks, distribution of oral rabies vaccines has been performed in an appr. 30 km area around Szerencs, the city in Borsod-Abaúj-Zemplén county, where rabies cases were confirmed in spring 2016 (1 fox) and spring 2017 (1 fox and 2 goats). The National Food Chain Safety Office provided the vaccine baits from the state emergency stock. An area of 2.240 km2 has been vaccinated, and 44.800 vaccine baits (Lysvulpen) were purchased and distributed. The baits were distributed with the use of airplanes. All airplanes are equipped with GPS systems to record the flight routes and dropping of baits. The average bait density on the area covered was 20 baits/km2.

In autumn 2018, following a new tender procedure, an area of 41.970 km2 has been vaccinated, which is 45% of the territory of Hungary. In total, 839.400 vaccine baits (Lysvulpen) were purchased and distributed during the 2018 autumn campaign. The baits were distributed with the use of airplanes. All airplanes are equipped with GPS systems to record the flight routes and dropping of baits. The average bait density on the area covered was 20 baits/km2. The distributor companies and the personnel of the airplanes were instructed not to drop baits in densely inhabitated areas and water bodies. Distance between flight lines was 1000 m, the flying speed is usually between 100 and 120 km/h. In each new campaign flying lines are rotated with 90 appr. degrees compared to the lines of the previous campaign. GPS is used for flying navigation and following the planned flight routes. On each airplane the vaccine dropping machine is controlled by a computer connected with GPS. Flying lines and the dropping places of each vaccine bait are recorded by a computer (connected with the GPS system). The flight routes are also recorded by an independent system and the data are sent automatically to the CA. During the vaccination campaign the central authority is able to control the distribution work on a daily basis.

Manual distribution was only supplementary (less than 1% of the baits were distributed manually). This distribution method is applied only in some specified areas where flying is prohibited or where a more precise distribution of baits is needed (i.e. around the shores of lake Balaton, oil and power plants and railway transfer zones), and it is carried out by qualified wildlife biologists. The bait density is 20 baits/km2.

Each batch of oral vaccine used in 2018 has been sampled by the competent authority before distribution. The samples were tested for quality in a competent laboratory (NFCSO Veterinary Medicinal Products Directorate). No batch was rejected.
As an additional measure, to control the effectiveness of cold chain, vaccine samples taken from the airfields after distribution have been tested for vaccine titres after 2018 autumn vaccination campaign. The titration results showed that the cold chain during the campaign was appropriate.

The efficiency of oral vaccination shall be monitored by laboratory methods. According to the Hungarian national legislation the number of samples to be collected is four foxes per 100 km2 in a year, in accordance with the 2005 WHO recommendation. Accordingly, 2 foxes/50 km2 (only from the vaccination area) shall be collected per campaign. Foxes are shot by licensed hunters who submit the whole body of the fox to the veterinary authority for laboratory testing. As of 2016, golden jackals can be submitted for testing as well. Hunters are legally obliged to submit the samples by an official decision issued by the competent county government office and payed 7000 HUF (22,4 EUR) excl. VAT for this activity. During the pre-campaign meetings organized in each county, the hunters are called upon to shoot and submit the suspect foxes and other suspect wild animals as well, over the obligatory shooting of the prescribed number of foxes and jackals for monitoring of effectiveness of OV.

Routine diagnostics of rabies in all animal species is carried out in three laboratories of the Veterinary Diagnostic Directorate (VDD) of the National Food Chain Safety Office: a central laboratory in Budapest, which is the NRL for Rabies, and two regional laboratories in Debrecen and in Kaposvár.

The tests for monitoring the efficiency of the oral immunization of foxes are also carried out in the laboratories of the VDD with the following methods:

- direct immunfluorescence (fluorescent antibody test -FAT) of imprints of the brain – test for confirmation of rabies,
- transversal tooth section – test for the presence of biomarker tetracyclines (test for bait uptake)
- serological (ELISA) test (this test is carried out only in Budapest).
- collecting, handling and analyzing of epidemiological data on diagnosed cases of rabies.

The awareness campaign started in 2016 is planned to be continued, but there were no costs specifically related to rabies awareness incurred in 2018.

1.2 Details on the level of achievement of the targets set in the approved programme and technical difficulties.

The final objective of the Hungarian rabies eradication program is to eliminate (sylvatic) rabies from wild animals in the whole territory of Hungary, applying measures and methods in accordance with Community legislation and international standards. The main objective of the 2017-2019 programme is to reduce the number of new rabies cases, and to prevent introduction of the disease from non-rabies free neighbouring areas. In 2015, no rabies cases were diagnosed in domestic animals or wildlife, neither in the border area with non-free countries, nor in the former (2013-2014) infected area. Only one bat (EBLV-1, Pest county) and one fox was found positive (Békés county, vaccine induced case, confirmed by the EURL). In 2016 one fox was found positive in Szerencs (Borsod-Abaúj-Zemplén county). According to the sequencing of the rabies virus, the strain was different from the 2013-2014 rabies virus strain. An emergency ring vaccination was performed during the 2016 spring campaign in a 50 km area around the case. In March 2017, in the same area, a red fox showing neurological symptoms was found positive again. The strain was identical to the one isolated in 2016. Two weeks later, in a farm close to the finding place of the fox, rabies was confirmed in two goats (a female and a kid). In 2018, no rabies cases were found in Hungary (one case of only EBLV-1, Pest county)

The target numbers of tests performed and vaccines distributed set out in the submitted program plan for 2018 have not been completely fulfilled, due to the missed national spring campaign (only ring vaccination performed). The programme has been revised accordingly in the 2018 intermediate report. Still, compared to the actual size of vaccination area in spring and autumn, the proportionate sample numbers have been achieved.

The 2018 spring ring vaccination campaign in Borsod-Abaúj-Zemplén county was performed successfully on 16.04.2018, and the autumn national campaign between 28.09.2018 and 04.10.2018, without any difficulties during the implementation. According to the findings of the FVO audit on the rabies programme in February 2015, in order to strengthen control over and verify effectiveness of the cold chain of vaccine storage, after the distribution of vaccines in October, we performed titration from vaccine samples taken from the airfields to control if there was any decrease in the titre. (The results were sufficient).

The target minimum number of foxes and jackals to be tested in the framework of monitoring of effectiveness of OV was 61 in the spring campaign and 840 in the autumn campaign. The yearly target number and the evaluation of the results refers to hunting year (01.03.2018-28.02.2019), because the sampling period after the autumn campaign (October) lasts until 28 February next year (from the practical point of view, it is impossible to shoot 2 foxes/50 km2 in 6 weeks, and from the professional point of view, the foxes shot in early 2018 are indicators of the previous years' autumn campaign effectiveness and not those of the 2018 vaccination, whereas the foxes shot and tested in early 2019 belong to the autumn sampling period of 2018). However, our financial report refers to calendar year (sampling costs and tests performed between 01.01.2018-12.31.2018).

For the hunting year 2018/2019, 106% of the planned number of samples was submitted. The proportion of tetracycline positive foxes was 76,73% and the proportion of seropositive foxes was 37,66%. In jackals, tetracycline positivity was 67,21% and seropositivity 39,53% (these data refer to the whole vaccinated area in the country and to samples collected in hunting year 2018/2019). For details, please see Excel attached.

The Agreement between Hungary and Ukraine on oral vaccination in a buffer zone of 10.200 km2 in Ukraine was signed by the HU party in May 2018. However, the Ukrainian colleagues informed us that in spite of a lot of efforts of the State Service of Ukraine on Food Safety and Consumer Protection (SSUFSCP), unfortunately no rabies oral vaccination campaign was performed in the framework of Agreement during 2018.

1.3 Epidemiological maps for infection and other relevant data on the disease/activities (information on serotypes involved,...) (Please attach files of data using the PDF attachement feature) Use the textbox below to provide clarifications for the maps you attach, if needed.

No rabies cases have been detected in Hungary in 2018.
Please find attached the maps showing the vaccination area in 2018 spring and autumn campaign (bait

dropping GPS data).

ANNEX VI TECHNICAL REPORT ON RABIES PROGRAMMES

VERY IMPORTANT: Please fill out the following tables with figures corresponding to measures performed during the implementing period (1/1 to 31/12).

Table A1 - TEST FOR THE MONITORING OF VACCINATION EFFECTIVENESS

Region	Species and age	Type of test	Test description	Number of tests	Number positive	% positive
Hungary (see table attached)	Foxes adult	Biomarker	Tetracycline in bones	234	216	92.31 %
Hungary (see table attached)	Foxes adult	Serological	VNT/FAVN/ELISA	155	60	38.71 %
Hungary (see table attached)	Foxes juvenile	Biomarker	Tetracycline in bones	660	470	71.21 %
Hungary (see table attached)	Foxes juvenile	Serological	VNT/FAVN/ELISA	408	152	37.25 %
Hungary (see table attached)	Jackals	Biomarker	Tetracycline in bones	61	41	67.21 %
Hungary (see table attached)	Jackals	Serological	VNT/FAVN/ELISA	43	17	39.53 %
Total				1,561	956	61.24 %

Table A2 - SURVEILLANCE TESTS

Region	Animal species	Category	Test description	Number of tests	Number of cases
Hungary (see table attached)	Foxes	Passive	fluorescent antibody test (IF)	360	0
Hungary (see table attached)	Jackals	Passive	fluorescent antibody test (IF)	8	0
Hungary (see table attached)	Dogs	Passive	fluorescent antibody test (IF)	171	0
Hungary (see table attached)	Cats	Passive	fluorescent antibody test (IF)	369	0
Hungary (see table attached)	Domestic ruminants	Passive	fluorescent antibody test (IF)	49	0
Hungary (see table attached)	Equidae	Passive	fluorescent antibody test (IF)	9	0
Hungary (see table attached)	Other species	Passive	fluorescent antibody test (IF)	63	0
Hungary (see table attached)	Foxes	Active	fluorescent antibody test (IF)	1,413	0
Hungary (see table attached)	Jackals	Active	fluorescent antibody test (IF)	71	0
Total				2,513	0

Number of rabies virus isolates typed for differentiation from vaccine	0
Typing results (please indicate the number of field strains/vaccine strains, and (optional) comment)	0

Table B - WILDLIFE ORAL VACCINATION

Aerial distribution data files:

Downloadable via URL	Available within 10 days counted from 26 April 2019 at the following link: https://app.nebih.gov.hu/nebihtrans/_layouts/15/LMSolutions/LMSolutions.NEBIH.FileUpload/Pages/download.html?folderId=6d514e6a-9300-48ba-989b-6d355c38cb9e

Description of the analysis performed by the Competent Authority on the aerial distribution data and conclusions of the assessment for the quality of the distribution:

During the vaccination campaigns the competent authority controls the implementation of the distribution work on a daily basis. At the end of each day of the campaign, the contractor for distribution provides daily report on the progress of work via telephone to the CA. The CA checks on the map (flight plan) which flight routes have been completed on the given day and how many baits have been distributed on the given flight lines. This is also recorded on the map to control the proper coverage of the vaccination area. Additionally, at the end of each day the GPS data of the flight routes and bait release, recorder by the computer devices of the airplanes, is sent electronically to the CA so that the checking of the quality of the work performed is possible with the use of a mapping software (QGIS). The flight data are also recorded by an independent system and automatically sent to the CA at the end of the day. GPS data are merged and analyzed during and after the campaign, and after the end of each campaign a meeting takes place where the contractor has to explain all the visible gaps. Typical reason for these gaps, especially in the spring campaign was water on the agricultural fields (inland inundation). Flight personnel stops the dropping machine in every case they see people performing outdoor activities or agricultural work in the vaccination area. No significant inadequacies, no overlaps or missing areas were found during the evaluation of the 2018 data. Please find attached the maps showing 2018 spring and autumn bait dropping data.

Start date of First Campaign	16/4/2018	**End date of First Campaign**	16/4/2018
Start date of Second Campaign	28/9/2018	**End date of Second Campaign**	4/10/2018

Region/Area	Product used	Number of doses	Size of vaccinated area (km^2)	Distribution method

Hungary spring - see attached table	Lysvulpen	44,800	2,240	Aerial
Hungary autumn - see attached table	Lysvulpen	839,400	41,970	Aerial
Total		884,200	44,210	

Table C - OFFICIAL CONTROL OF ORAL VACCINES BEFORE THEIR DISTRIBUTION

Number of batches distributed	Number of batches controlled by CA	Number of batches rejected
2	2	0

Batch number	Manufacturer	Sampling date	Virus titration result	Outcome of the titration
8425 - upon arrival	Bioveta	24/9/2018	1,8x10(6.8) TCID50/dose and 1,8x10(6.3) TCID50/dose	Acceptable
8525 - upon arrival	Bioveta	24/9/2018	1,8x10(6.1) TCID50/dose and 1,8x10(6.5) TCID50/dose	Acceptable
8425 - from Jakabszállás airfield	Bioveta	28/9/2018	1,8x10(6.1) TCID50/dose and 1,8x10(6.3) TCID50/dose	Acceptable
8425 - from Kaposújlak airfield	Bioveta	3/10/2018	1,8x10(6.1) TCID50/dose and 1,8x10(6.1) TCID50/dose	Acceptable
8425 - from Miskolc airfileld	Bioveta	29/9/2018	1,8x10(6.6) TCID50/dose and 1,8x10(6.5) TCID50/dose	Acceptable
8425 - from Békéscsaba airfield	Bioveta	28/9/2018	1,8x10(6.1) TCID50/dose and 1,8x10(6.5) TCID50/dose	Acceptable
8525 - from Hajdúszoboszló airfield	Bioveta	2/10/2018	1,8x10(6.5) TCID50/dose and 1,8x10(6.5) TCID50/dose	Acceptable

COMMENT / ADDITIONAL CLARIFICATION

It would be useful to enable also uploading of jpeg files, because in case of maps and images (eg. bait dropping GPS images), they are of better quality.
Table A1 refers to hunting year, because the foxes and jackals shot before the 2018 spring campaign are not considered for the evaluation of the 2019 vaccination campaigns, and similarly the test results of foxes and jackals shot in early 2019 are indicators of the 2018 autumn campaign.
Table B1 refers to calender year 2018 (01.01.2018-12.31.2018).
However, the financial table refers to calender year 2018 (activities and tests performed in 2018).
For furhter details by region, please find attached an Excel table.