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CONTROL AND ELIMINATION OF RABIES IN EUROPE: CHALLENGES AND STRATEGIES FOR A RABIES-FREE EUROPE

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***Summary**: At the beginning of the 21st century, rabies, the oldest known zoonosis to mankind, is still a notoriously underreported and neglected disease in many parts of the world causing tens of thousands of human deaths annually. Together with WHO and FAO, the OIE has taken a leadership role in reducing the public health and economic burden of rabies by controlling and eliminating the disease at the animal source and by identifying the current epidemiological situation in the OIE Regions as well as by identifying the control measures and the challenges faced by the Veterinary Services of Member Countries in implementing the OIE guidelines and standards.*

During the 83rd General Session of the OIE World Assembly of Delegates held in Paris in May 2015, the OIE Regional Commission for Europe adopted 'Control and elimination of rabies in Europe: Challenges and strategies for a rabies-free Europe' as the Technical Item 1 (with questionnaire) to be presented during the 27th Conference of the OIE Regional Commission for Europe (Lisbon, Portugal, 19–23 September 2016).

The questionnaire developed to address Technical Item 1 was sent to all Member Countries of the Region and resulted in 49 of 53 Member Countries responding (92% response rate). This response rate, being the highest from this OIE Region on a questionnaire related to a Technical Item to be presented in a Conference of the OIE Regional Commission for Europe, indicates a high level of interest in this topic by the Member Countries. There was a range of responses across a variety of topics including epidemiological situation, rabies surveillance, diagnostic capacities and capabilities, reporting, legislation, use of guideline and standards, host reservoir, targeted rabies control programmes and related issues, stray dog population management, cross-border collaboration, intersectorial collaboration and the challenges ahead related to this disease.

The variability of responses reflects differences in epidemiological situations in the Region ranging from freedom of disease (51%) to endemic occurrence in either wildlife – or in both dog – and wildlife-mediated rabies (49%). In addition, the variability of responses demonstrates differences in challenges associated with disease surveillance and control, including public awareness and communication. Although 34% of endemic countries envisage elimination of rabies within the next five years, one third of responders (32%) indicated the desire for OIE to be more proactive and to provide guidance to Member Countries that would support Competent Authorities and Veterinary Services in their efforts of eliminating rabies form their countries. The greatest emphasis was placed on rabies surveillance, standardised and efficient rabies control measures (including training and facilitation of cross border activities), as well as adequate support in the design, financing, implementation and monitoring of stray dog population management programmes.

***Keywords**: disease control – Europe – public veterinary health – rabies – World Organisation for Animal Health (OIE) – zoonosis.*

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1. Introduction

During the 83rd General Session of the OIE World Assembly of Delegates held in Paris in May 2015, the OIE Regional Commission for Europe adopted 'Control and elimination of rabies in Europe: Challenges and strategies for a rabies-free Europe' as the Technical Item 1 (with questionnaire) to be presented during the 27th Conference of the OIE Regional Commission for Europe (Lisbon, Portugal, 19–23 September 2016). This report covers the background of rabies control and elimination efforts in Europe as well as challenges associated with and strategies for a rabies-free Europe with a focus on the current statuses of Member Countries and Veterinary Services across the domains outlined in Technical Item 1 questionnaire and responses provided. A discussion on the results of the questionnaire is provided, including recommendations based on observations from the results.

2. Overview

It is a societal tragedy that in the 21st century, a zoonosis that is one hundred per cent preventable in humans and can be easily controlled in its domestic animal species reservoir is still neglected and continues to create a significant social and economic burden in many countries worldwide, in particular in low-income countries where awareness of the disease and access to appropriate preventive and post-exposure prophylaxis are limited or non-existent [1]. While wildlife mediated rabies prevails in the northern hemisphere [2], the dog is the main reservoir of rabies on a global level, responsible for nearly 95% of fatal rabies cases in humans [3]. Recent epidemiological studies, aimed at estimating the public health and economic burden of rabies circulating in domestic dog populations, showed that globally, canine rabies causes approximately 59,000 human deaths, over 3.7 million disability-adjusted life years (DALYs) and 8.6 billion USD economic losses annually [4]. In order to achieve worldwide elimination of rabies, the OIE is committed to supporting the efforts of the international community in attaining sustainable prevention of rabies at the animal source. Two regional conferences (Kiev in 2005 and Paris in 2007) and two Global Conferences (Seoul in 2011 and Geneva 2015) on rabies highlighted the need for intersectoral collaboration in line with the One Health Approach and supported by a consistent and a sustained political commitment and underpinned by robust public and veterinary health systems. As a consequence, the Tripartite Alliance, comprised of the FAO, the OIE, and the WHO, identified rabies as a priority disease and is committed to breaking the cycle of transmission of this devastating disease from animals to humans.

The last Global Conference on rabies, held in Geneva in 2015, was jointly organised by OIE and WHO in collaboration with FAO and supported by the Global Alliance for Rabies Control (GARC). The title of the conference was 'Global elimination of dog-mediated human rabies – the time is now'. Based on the consensus reached by the conference participants, a Global Framework was developed to provide a coordinated approach and vision for the global elimination of dog-mediated human rabies with the intention to harmonise interventions and to provide adaptable and achievable guidance for country and regional elimination strategies [3].

In Europe, although large parts of the Region are free from disease, thanks to intensive efforts to control and eliminate both dog- and wildlife-mediated rabies, complete elimination of rabies from the Region has not yet been achieved [5].

By developing guidelines and international standards, the OIE enhances the integration of rabies control into national and regional networks, promotes the health and welfare of animals, and safeguards human health through its work in the improvement of standards for diagnosis and for early detection, reporting and control of animal diseases and zoonoses. Chapter 8.13 of the OIE *Terrestrial Animal Health Code* (the *Terrestrial Code*) and Chapter 2.1.13 of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (the *Terrestrial Manual*) set standards to be used by the Veterinary Authorities for *a)* early detection, reporting and control of rabies, to prevent its transfer via international trade of terrestrial animals and for *b)* adequate rabies diagnostic techniques and requirements for vaccines, respectively [6]. In addition, Chapter 7.7 of the *Terrestrial Code* provides recommendations on stray dog population management and control as an integral part of rabies control programmes.

During the 84th General Session of the World Assembly of the Delegates of the OIE (Paris 2016), all 180 Member Countries adopted resolution No. 26 on global elimination of dog-mediated

rabies. Member Countries committed to develop or refine their respective national and regional rabies elimination strategies with the aim of achieving the elimination of dog-mediated rabies by 2030.

This Technical Item explores the role of Veterinary Authorities in managing rabies control and elimination at the animal source and aims to build a shared vision in the Region on how to achieve sustainable control and elimination of rabies and on how to identify current achievements as well as challenges ahead in eliminating both dog- and wildlife-mediated rabies. The information presented draws on the experiences of Member Countries within the OIE Regional Commission for Europe.

3. Material and methods

The analysis of the responses is reported here and will be presented and discussed during the 27th Conference of the OIE Regional Commission for Europe with the aim of building a shared vision in the Region addressing, in a sustainable manner, achievements as well as challenges ahead in eliminating both canine- and wildlife-mediated rabies.

In order to evaluate the rabies situation and the capacity of the Veterinary Services of the Member Countries of the European Region, a questionnaire was sent by e-mail to the Delegates of the 53 Members Countries of the Region. Members were asked to respond to a questionnaire that included 42 questions relating to three aspects of rabies surveillance and control, namely:

a) epidemiological situation,
b) control measures and
c) challenges.

The responses to the questionnaire were collected in a database and analysed. The results, provided in tabular form, include both the number of responses and the correlating percentage of applicable responses (see Annex 1).

4. Results and discussion

There were 49 responding countries out of 53 countries queried (92% response rate); this is the highest response rate from this OIE Region on a questionnaire related to a Technical Item to be presented in a Conference of the OIE Regional Commission for Europe. The high response rate obtained indicates a strong interest in the topic by Member Countries of the OIE Regional Commission for Europe. The variability in the range of responses, including non-responses, as well as specific answers to the role of OIE, indicates the need for additional work required by countries and organisations to strengthen their efforts in rabies control.

4.1. Epidemiological situation

The variability of responses reflects differences in epidemiological situations in the Region ranging from freedom of disease to endemic occurrence. Less than half of the countries (38.8%) reported that terrestrial rabies caused by RABV[3] is present in their countries. From a geographical point of view, however, this represents the far greater part of the Region. Rabies caused twenty one case fatalities in 2014 and twenty case fatalities in 2015, with the majority of fatalities being reported from Tajikistan and Russia.

Based on responses provided, 51.0% (N=25) have self-declared freedom from rabies. However, only a minority of the Member Countries followed the protocol for self-declaration based on the provisions of the *Terrestrial Code* Chapter 1.6 on procedures for self-declaration and for official recognition by the OIE. Member Countries wishing to self-declare free of rabies should inform the OIE of its fulfilment with the provisions of Article 8.13.3. on Rabies free country. In addition to those Member Countries that have already self-declared freedom from rabies, 17 Member Countries envisage eventual freedom from rabies, mostly (N=11) within the next five years. Bat rabies was reported to occur in 18 Member Countries.

3 RABV: classical rabies virus

Wildlife rabies is dominant in rabies endemic countries, with red foxes, the raccoon dogs and jackals as reservoir species. Slightly more than 40% of Member Countries responded that dogs are a reservoir in their country. Additionally, some Member Countries stated that rodents (rats) or wolves act as reservoirs. These answers may indicate insufficient knowledge on the epidemiology of the disease. Although wolves can contract the disease and transmit it to other animals including humans, their social behaviour does not support an independent transmission among wolves. Rodents do not play a role in rabies, neither as a reservoir nor as a transmitter.

In the majority of countries, the presence or absence of the disease is demonstrated by passive surveillance focused on the investigation of any suspect animal. Surveillance is also maintained by all except one Member Country that has gained rabies-free status. According to Article 8.13.3 of the *Terrestrial Code*, a prerequisite for becoming a rabies free country is to have an on-going system of disease surveillance in accordance with Chapter 1.4 in operation for at least the past two years.

Bats are included in rabies surveillance in only 40% of responding countries. The disease is universally detected using laboratory confirmation (100%), whereby a very high percentage (93%) of countries applies the OIE recommended fluorescent antibody test (FAT). As a confirmatory test, the majority of countries use virus isolation in cell culture (VIC, 31%), whereas 19% still use the mouse inoculation (MIT) test. As stated in the *Terrestrial Manual*, the latter confirmatory test should be phased out, as VIC is as sensitive as MIT, but does not necessitate the use of animals. Although molecular techniques are not yet regarded as standard tests for the diagnosis of rabies, nearly 90% of Member Countries have established PCR as a diagnostic tool. There are three OIE reference laboratories for rabies in the Region, i.e. ANSES, Nancy, France, APHA, Weybridge, United Kingdom, and FLI, Greifswald-Insel Riems, Germany, with the mandate to provide laboratory support or confirmation of results as needed upon request. All responding Member Countries comply with the requirements of reporting rabies surveillance data to the OIE WAHIS database. Some Member Countries also report data to The WHO Rabies Bulletin database and the EU Animal Disease Notification System (ADNS) system as well as to the EFSA for its report on zoonoses.

4.2. Control measures

Throughout the European Region, rabies appears to be an integral part of veterinary legislation, and in the vast majority of Member Countries (98%), rabies is notifiable based on a clear case definition. According to the OIE standards, Member Countries are obliged to classify rabies as a notifiable disease and regularly report the occurrence or absence of disease to the OIE. All but one Member Country affirmed that animal importation is in compliance with Chapter 8.13. of the *Terrestrial Code*. In the case of an outbreak or an increased risk of incursion, 38 Member Countries have a contingency plan. According to the OIE standards, Member Countries should have an ongoing early detection programme to ensure investigation and reporting of rabies suspect animals. Rabies control or elimination programmes are implemented in 33 Member Countries and target mainly red foxes (73.5%) and/or dogs (73.5%). Legislative frameworks (92%) and mass dog vaccination campaigns (76%) were reported as core components of dog rabies control programmes, while only 40% reported the use of communication plans or of evaluation of campaigns as core components of a control programme.

Experiences from many rabies control programmes have demonstrated that success depends on implementation of the five pillars of rabies elimination including increased communication, awareness and education. These pillars were laid down in the Global framework to eliminate dog-mediated human rabies by 2030 [3].

Unowned or stray dog (and cat) populations are considered a problem in 21 Member Countries (43%), and dog population control programmes are in place in some Member Countries that do not consider stray dog populations to be a problem of public health concern. Dog movement control (92%) and enforcement of responsible dog ownership (86%) through registration and identification are core components of these control programmes. Although there is scientific evidence to support the inefficacy of euthanasia as a method for rabies control, it is still used as a population control measure in 50% of all Member

Countries. Member Countries should consult Chapter 7.7. of the *Terrestrial Code* for dog population control methods that ensure the welfare of the animals. Member Countries should provide for a dog population census in order to identify a stray dog population problem and to tailor their dog population control measures. Unfortunately, not all Member Countries provide for a dog population census and therefore cannot identify a problem with stray dogs.

Anti-rabies vaccination of domestic animals is compulsory in 25 Member Countries, and it should be mandatory in those Member Countries where dog-mediated rabies is present. Compulsory vaccination together with mass dog vaccination should provide for the 70% vaccination coverage needed to interrupt the disease transmission cycle. All vaccines for parenteral use comply with the OIE quality standards as laid down in Chapter 2.1.13. of the *Terrestrial Manual*. Most Member Countries (82%) with endemic wildlife rabies applied oral rabies vaccination using one or two of five reported vaccine strains, i.e. ERA G333, SAD B 19, SAG2, VRG and SAD Bern, the latter being the most widely used strain at present.

Within the European Region, cross-border collaboration with neighbouring countries on rabies control is widely used. Veterinary Authorities share, in particular, ad hoc information on outbreaks or increased risks in border areas as well as surveillance data. All but one Member Country reported coordination between veterinary and human public health authorities. However, it appears that coordination between public health authorities is often limited to exchange of information and data. Close collaboration and coordination between human and animal health sectors and other stakeholders in line with the One Health approach has been demonstrated to be effective in rabies elimination [3].

4.3. Challenges

Based upon their prevailing epidemiological situation, Member Countries identified and ranked the biggest challenges to self-declaring free from rabies or to remaining free from rabies. For those Member Countries who have self-declared free from rabies, illegal importation of pet animals and reinfection from neighbouring infected areas are the biggest challenges. In contrast, rabies-endemic countries regarded the lack of funding and the constant risk of reinfection from neighbouring countries as the biggest challenges. Since rabies is a transboundary animal disease, regional coordination and collaboration is particularly needed in rabies-endemic countries.

While 80% of responders consider the work being carried out by the OIE as sufficient to make a difference in the elimination of both wildlife- and dog-mediated rabies in the Region, one third of responders (32%) indicated the desire for OIE to be more proactive and provide guidance to Member Countries. Specifically, support is needed in rabies surveillance, in standardised and efficient rabies control measures, including training, facilitation of cross border activities, as well as support in the design, financing, implementation, and monitoring of stray dog population management programmes.

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Annex 1

Responses to the questionnaire

Responding countries

1 Albania
2 Armenia
3 Austria
4 Belarus
5 Belgium
6 Bosnia and Herzegovina
7 Bulgaria
8 Croatia
9 Cyprus
10 Czech Republic
11 Denmark
12 Estonia
13 Finland
14 France
15 Georgia
16 Germany
17 Greece
18 Hungary
19 Iceland
20 Ireland
21 Israel
22 Italy
23 Kazakhstan
24 Kyrgyzstan
25 Latvia
26 Liechtenstein
27 Lithuania
28 Luxembourg
29 Macedonia (Former Yug. Rep. of)
30 Malta
31 Montenegro
32 Norway
33 Poland
34 Portugal
35 Romania
36 Russia
37 San Marino
38 Serbia
39 Slovakia
40 Slovenia
41 Spain
42 Sweden
43 Switzerland
44 Tajikistan
45 The Netherlands
46 Turkey
47 Turkmenistan
48 United Kingdom
49 Uzbekistan

Non responding countries

1 Andorra
2 Azerbaijan
3 Moldova
4 Ukraine

1. Epidemiological situation

1.1 Is terrestrial rabies caused by the classical rabies virus (RABV) endemic in your country?

	Reported	Percentage
Yes	19	38.8%
No	30	61.2%

1.2 If the answer to 1.1 is yes, which are the reservoir species?

	Reported	Percentage
Red foxes	17	89.5%
Raccoon dogs	2	10.5%
Dogs	8	42.1%
Other	5	26.3%
Not applicable	30	61.2%

Other	Reported
Cat	1
Foxes	1
Jackals	3
Rats	1
Wolf	1
No answer	1

1.3 Is bat rabies known to occur in your country?

	Reported	Percentage
Yes	18	36.7%
No	31	63.3%

1.4 If the answer to 1.1 or 1.3 is yes, what type of rabies surveillance is established in your country?

	Reported	Percentage
Passive surveillance	31	91.2%
Active surveillance	20	58.8%
Passive only	13	38.2%
Active only	2	5.9%
Both	18	52.9%
None	1	2.9%
Not applicable	15	30.6%

1.5 If your country has a rabies surveillance system, what animal species are included?

	Reported	Percentage
Any suspect animal	39	83.0%
Wildlife reservoir species	34	72.3%
Owned dogs and cats	24	51.1%
Other wildlife	21	44.7%
Stray dogs and cats	20	42.6%
Bats	19	40.4%
Other domestic animals	16	34.0%
Not applicable	2	4.1%

1.6 Based on the provisions of Article 8.13.3. of the *Terrestrial Code*, has your country self-declared freedom from rabies?

	Reported	Percentage
Yes	25	51.0%
No	24	49.0%

1.7 If the answer to 1.6 is no, does your country envisage self-declaration of freedom from rabies according to Article 8.13.13. of the *Terrestrial Code*?

	Reported	Percentage
Yes	17	68.0%
No	8	32.0%
Not applicable	24	49.0%

1.8 If the answer to 1.7 is yes, when do you envisage elimination of rabies in your country?

	Reported	Percentage
Yes with year	16	94.1%
Within 5 years/ By 2020	11	64.7%
Within 10 years/ By 2025	2	11.8%
Within 15 years/ By 2030	3	17.6%
Yes, year not known	1	5.9%
Not applicable	32	65.3%

1.9 If your country has gained a rabies free status according to Article 8.13.3. of the *Terrestrial Code*, is rabies surveillance being maintained?

	Reported	Percentage
Yes	25	96.2%
No	1	3.8%
Not applicable	23	46.9%

1.10 How many rabies cases have been detected in your country in the past two years?

	2014				2015			
Species	**Reported**	**Percentage**	**Minimum**	**Maximum**	**Reported**	**Percentage**	**Minimum**	**Maximum**
Humans	43	87.8%	1	7	43	87.8%	2	10
Dogs	45	91.8%	1	453	46	93.9%	1	938
Bats	41	83.7%	1	22	41	83.7%	1	15
Other wildlife	45	91.8%	1	1,227	45	91.8%	2	1,974
No answer	2	4.1%			2	4.1%		

Human cases

	2014	2015	Total
Georgia	4	0	4
Israel	1	0	1
Kyrgyzstan	1	2	3
Russia	3	6	9
Spain	1	0	1
Tajikistan	7	10	17
Turkey	4	2	6
Total	21	20	

1.11 When was the last human rabies case in your country reported?

	Reported	Percentage
Year or range provided	37	75.5%
Within the last 5 years/ 2010–2016	16	32.7%
Within the last 10 years/ 2005–2010	3	6.1%
Within the last 15 years/ 2000–2005	4	8.2%
Over 15 years ago/ Before 2000	16	32.7%
Other	5	10.2%
No answer	5	10.2%

	Reported	Percentage
Indigenous	21	53.8%
Imported	15	38.5%
No answer	3	7.7%
Not applicable	10	20.4%

1.12 How is rabies in animals and humans diagnosed in your country?

		Reported	Percentage
Humans	Clinical signs	26	53.1%
	Laboratory tests	43	87.8%
	Clinical signs only	2	4.1%
	Laboratory tests only	19	38.8%
	Both	24	49.0%
	None	4	8.2%
Animals	Clinical signs	28	57.1%
	Laboratory tests	49	100.0%
	Clinical signs only	0	0.0%
	Laboratory tests only	21	42.9%
	Both	28	57.1%
	None	0	0.0%

1.13 How many laboratories have the technical capability to diagnose rabies in your country? Is there a national reference laboratory (NRL) or sub-regional (SRLs) for rabies?

			Reported	Percentage
Human	SRL	Yes	8	16.3%
		No	27	55.1%
		No data	1	2.0%
		No answer	13	26.5%
	NRL	Yes	29	59.2%
		No	14	28.6%
		No answer	6	12.2%
Veterinary	SRL	Yes	23	46.9%
		No	20	40.8%
		No answer	6	12.2%
	NRL	Yes	43	87.8%
		No	4	8.2%
		No answer	2	4.1%

1.14 According to Chapter 2.1.13. of the *Terrestrial Manual*, which diagnostic tests are available at the sub-national rabies laboratories and the NRL in your country?

		Reported	Percentage
Fluorescent antibody test	SRL	21	45.7%
	NRL	43	93.5%
ELISA	SRL	4	8.7%
	NRL	24	52.2%
DRIT	SRL	0	0.0%
	NRL	6	13.0%
Other	SRL	0	0.0%
	NRL	5	10.9%
Cell culture	SRL	6	13.0%
	NRL	31	67.4%
Mouse inoculation	SRL	9	19.6%
	NRL	19	41.3%
PCR	SRL	5	10.9%
	NRL	40	87.0%
FAVN	SRL	7	15.2%
	NRL	29	63.0%
RFFIT	SRL	3	6.5%
	NRL	17	37.0%
Not applicable		3	6.1%

1.15 To which international entities are rabies cases in humans and animals and rabies surveillance data notified/ reported?

	Reported	Percentage
OIE/ WAHIS	49	100.0%
No	0	0.0%
No answer	0	0.0%
WHO Rabies Bulletin Europe	41	83.7%
No	7	14.3%
No answer	1	2.0%
EU/ ADNS	36	73.5%
No	12	24.5%
No answer	1	2.0%
EFSA	32	65.3%
No	16	32.7%
No answer	1	2.0%

2. Control measures

2.1 Is rabies in animals and humans notifiable in your country?

		Reported	Percentage
Human	Yes	46	93.9%
	No	2	4.1%
	No answer	1	2.0%
Animal	Yes	48	98.0%
	No	1	2.0%

2.2 Is there a specific national legislation on animal rabies control in place in your country?

	Reported	Percentage
Yes	44	89.8%
No	5	10.2%
Not applicable	0	0.0%

2.3 If you answered yes to 2.2, does this legislation provide a case definition for rabies?

	Reported	Percentage
Yes	36	81.8%
No	8	18.2%
Not applicable	5	10.2%

2.4 Based upon case definitions described in your legislation or relevant policy, is laboratory confirmation of rabies diagnosis required?

	Reported	Percentage
Yes	47	97.9%
No	1	2.1%
Not applicable	1	2.0%

2.5 Is animal importation included in the national legislation on animal rabies control?

	Reported	Percentage
Yes	43	97.7%
No	1	2.3%
Not applicable	5	10.2%

2.6 Are the measures for animal importation in your country in compliance with Chapter 8.13. of the *Terrestrial Code*?

	Reported	Percentage
Yes	48	98.0%
No	1	2.0%
Not applicable	0	0.0%

2.7 Is a rabies control or elimination programme implemented in your country?

	Reported	Percentage
Yes	33	67.3%
No	16	32.7%
Not applicable	0	0.0%

2.8 If the answer to 2.7 is yes, what species does it target?

		Reported	Percentage
Red foxes	Yes	25	73.5%
	No	8	23.5%
	Not applicable	16	32.7%
Raccoon Dogs	Yes	10	29.4%
	No	23	67.6%
	Not applicable	16	32.7%
Dogs	Yes	25	73.5%
	No	8	23.5%
	Not applicable	16	32.7%
Other	Yes	17	50.0%
	No	16	47.1%
	Not applicable	16	32.7%
No answer		1	2.9%

Other	Reported
All susceptible animals	1
All susceptible species	1
All suspect animals that are sensitive to the rabies virus	1
Any rabies susceptible species	1
Badger kept in capture	1
Carnivores	1
Cats	4
Domestic ferret	1
Golden jackal	1
Jackals	3
Livestock animals	1
Other domestic species susceptible to rabies	1
Rodents	1

2.9 With reference to Article 8.13.2. of the *Terrestrial Code*, if dogs are the target species you indicated in 2.8., what are the core components of the dog rabies control programme?

		Reported	Percentage
Legislative framework	Yes	23	92.0%
	No	2	8.0%
	Not applicable	24	49.0%
Communication plan	Yes	10	40.0%
	No	15	60.0%
	Not applicable	24	49.0%
Epidemiological assessment	Yes	17	68.0%
	No	8	32.0%
	Not applicable	24	49.0%
Dog bite prevention programme	Yes	14	56.0%
	No	11	44.0%
	Not applicable	24	49.0%
Mass dog vaccination campaigns	Yes	19	76.0%
	No	6	24.0%
	Not applicable	24	49.0%
Evaluation of campaigns	Yes	10	40.0%
	No	15	60.0%
	Not applicable	24	49.0%

2.10 Are unowned or stray dog (and cat) populations considered a problem in your country?

	Reported	Percentage
Yes	21	42.9%
No	27	55.1%
No answer	1	2.0%

The term 'considered' is subjective and could be up for interpretation by some countries.

2.11 If yes, is there a dog population control programme, as described in Chapter 7.7. of the *Terrestrial Code*, in place?

	Reported	Percentage
Yes	24	82.8%
No	4	13.8%
No answer	1	3.4%
Not applicable	20	40.8%

Five countries indicated that a dog population control programme is in place despite stray dogs not being a problem. Other countries may have chosen not to respond to the question if stray dogs were not considered a problem.

2.12 What measures, as laid down in Article 7.7.6. of the *Terrestrial Code*, are implemented in your country to control dog populations?

	Reported	Percentage
Control of dog movement - international (export/ import)	45	91.8%
Education and legislation for responsible ownership	42	85.7%
Registration and identification of dogs (licensing)	40	81.6%
Capture and return, rehoming or release	33	67.3%
Regulation of commercial dog dealers	32	65.3%
Control of dog movements – within country (e.g. leash laws, roaming restrictions)	31	63.3%
Euthanasia	24	49.0%
Removal and handling	23	46.9%
Reproductive control	22	44.9%
Reduction in dog bite incidence	20	40.8%
Environmental controls	14	28.6%
None	1	2.0%

2.13 Is registration of owned dogs using regional/central databases compulsory in your country?

	Reported	Percentage
Yes	38	77.6%
No	11	22.4%

2.14 Does your country conduct dog population censuses, using methods recommended in Article 7.7.8. of the *Terrestrial Code*?

Self-declared freedom from rabies	Dog-population census	Reported	Percentage
Yes	Yes	13	52.0%
	No	12	48.0%
No	Yes	10	41.7%
	No	13	54.2%
	No answer	1	4.2%

2.15 Based on the latest census, what is the estimated number of dogs in your country?

	Reported	Percentage	Minimum	Maximum
Year	32	65.3%	2000	2016
Not applicable	1	2.0%		
No answer	16	32.7%		
Owned dogs | Number	33	67.3%	2,158	10,400,000
Other*	4	8.2%		
No answer	12	24.5%		
Stray dogs | Number	11	22.4%	1,647	900,000
Zero	10	20.4%		
Other**	11	22.4%		
No answer	17	34.7%		

* Owned dogs/ Other	Reported
Not known	1
No data	1
Not applicable	1
Not available	1

** Stray dogs/ Other	Reported
No answer	2
Not known	1
No data	5
Not estimated	1
Not applicable	1
Not available	1

Some countries may have interpreted that only censuses that use methods in the *Terrestrial Code* are applicable. Numbers may be underreporting.

2.16 If the target species you indicated in 2.8. is wildlife (i.e. red foxes, raccoon dogs), what measures are implemented to control rabies in these species?

	Reported	Percentage
Intensive hunting	5	17.9%
No	22	78.6%
No answer	1	3.6%
Not applicable	21	42.9%
Oral rabies vaccination (ORV)	23	82.1%
No	4	14.3%
No answer	1	3.6%
Not applicable	21	42.9%
Other	4	14.3%
No	23	82.1%
No answer	1	3.6%
Not applicable	21	42.9%
None	1	3.6%
No	26	92.9%
No answer	1	3.6%
Not applicable	21	42.9%

Other	Reported
Deratisation, bait, etc.	1
laboratory examination of 4 hunted (dead found) foxes (racoon dogs)/100 km²	1
Rabies free, wildlife reservoir species and pets are randomly investigated;	1
Testing of target species (foxes) for detection of rabies virus and for monitoring of the vaccination effectiveness; testing of target suspect/indicator animals of all susceptible species found on the whole territory of the country	1

2.17 If you use oral rabies vaccination (ORV) to combat wildlife rabies, please provide information on the following issues:

	Reported	Percentage	Minimum	Maximum
Yes	22	91.7%		
Km²	23	95.8%	2,500	54,761.5
Frequency of vaccine bait distribution per year	23	95.8%	1	3
Aerial	23	95.8%		
Manual	8	33.3%		
Vaccine strain used	20	83.3%		
Baits/km²	23	95.8%	16	40
Bait uptake	22	91.7%		
Seroconversion	22	91.7%		
Not applicable	25	51.0%		

Vaccine strain	Reported	Percentage
ERA G333	1	4.2%
SAD B 19	4	16.7%
SAD Bern	12	50.0%
SAG2	4	16.7%
VRG	1	4.2%
No answer	3	12.5%

One country provided answers to the first two parts of the question despite 2.16 not being applicable. These answers were included in the analysis.

Two countries use two vaccine strains.

2.18 Is anti-rabies vaccination of domestic animals compulsory in your country? If yes, how many domestic animals were vaccinated in the past two years?

		2014		2015	
		Reported	Percentage	Reported	Percentage
Dogs (owned)	Yes	32	65.3%	32	65.3%
	No	17	34.7%	17	34.7%
Cats (owned)	Yes	20	40.8%	20	40.8%
	No	26	53.1%	26	53.1%
	No answer	3	6.1%	3	6.1%
Cattle	Yes	8	16.3%	9	18.4%
	No	30	61.2%	30	61.2%
	No answer	11	22.4%	10	20.4%
Small ruminants	Yes	6	12.2%	7	14.3%
	No	31	63.3%	31	63.3%
	No answer	12	24.5%	11	22.4%
Other livestock	Yes	6	12.2%	7	14.3%
	No	30	61.2%	30	61.2%
	No answer	13	26.5%	12	24.5%

	2014	2015			
Country	Dogs vaccinated		Census year	Census	Per cent vaccinated
Belarus	389,183	372,576	No answer	No answer	
Croatia	350,060	355,881	2015	355,881	100.0%
Czech Republic	1,600,000	1,600,000	2015	2,000,000	80.0%
Denmark	>54,000	>62,000	2000	550,000	
Estonia	24,517	19,439	2014	95,829	20.3%
Georgia	179,759	191,285	No answer	350,000	54.7%
Hungary	1,118,000	1,200,000	2015	1,500,000	80.0%
Israel	251,367	253,811	2015	400,000	63.5%
Kazakhstan	586,270	829,852	No answer	No answer	
Kyrgyzstan	453,114	164,429	2016	417,595	39.4%
Latvia	65,165	54,170	No answer	No answer	
Lithuania	128,381	125,781	No answer	n/k	
Montenegro	2,176	1,833	No answer	No answer	
Poland	2,576,304	2,651,785	No answer	No answer	
Portugal	164,827	85,805	2014	1,400,000	6.1%
Romania	1,062,983	1,455,669	2015	3,000,000	48.5%
Serbia	278,635	267,646	2014	278,602	96.1%
Slovenia	174,700	89,371	2016	223,822	39.9%
Tajikistan	No answer	64,594	2016	375,000	17.2%
Turkey	611,798	665,666	2015	No answer	
Turkmenistan	96,399	95,492	No answer	No answer	
Uzbekistan	1,119,700	1,302,300	No answer	1,340,000	97.2%

			2014		2015	
	Self-declared freedom from rabies	**Compulsory vaccination**	**Reported**	**Percentage**	**Reported**	**Percentage**
Dogs (owned)	Yes	Yes	12	24.5%	12	24.5%
		No	13	26.5%	13	26.5%
	No	Yes	20	40.8%	20	40.8%
		No	4	8.2%	4	8.2%
Cats (owned)	Yes	Yes	6	12.2%	6	12.2%
		No	17	34.7%	17	34.7%
		No answer	2	4.1%	2	4.1%
	No	Yes	14	28.6%	14	28.6%
		No	9	18.4%	9	18.4%
		No answer	1	2.0%	1	2.0%
Cattle	Yes	Yes	2	4.1%	2	4.1%
		No	18	36.7%	18	36.7%
		No answer	5	10.2%	5	10.2%
	No	Yes	6	12.2%	7	14. 3%
		Non	12	24.5%	12	24.5%
		No answer	6	12.2%	5	10.2%
Small ruminants	Yes	Yes	1	2.0%	1	2.0%
		No	19	38.8%	19	38.8%
		No answer	5	10.2%	5	10.2%
	No	Yes	5	10.2%	6	12.2%
		No	12	24.5%	12	24.5%
		No answer	7	14.3%	6	12.2%
Other livestock	Yes	Yes	2	4.1%	2	4.1%
		Non	17	34.7%	17	34.7%
		No answer	6	12.2%	6	12.2%
	No	Yes	4	8.2%	5	10.2%
		No	13	26.5%	13	26.5%
		No answer	7	14.3%	6	12.2%

Some countries provided numbers of animals vaccinated for species where vaccination is not compulsory. Other countries may have chosen not to provide numbers for non-compulsory species. All numbers provided have been included in the analysis.

2.19 To your knowledge, do the rabies vaccines used in your country comply with the OIE quality standards in Chapter 2.1.13. of the *Terrestrial Manual*?

	Reported	**Percentage**
Yes	48	98.0%
Not applicable	1	2.0%

2.20 What activities are implemented to promote cross-border collaboration with neighbouring countries on rabies control?

	Reported	Percentage
Exchange of *ad hoc* information between Veterinary Authorities on outbreaks or increased risks in border areas	38	77.6%
No	11	22.4%
Frequent exchange of information / data between Veterinary Authorities at a ministerial level	31	63.3%
No	18	36.7%
Frequent exchange of information / data between Veterinary Authorities at a local level	19	38.8%
No	30	61.2%
Regular meetings with Veterinary Authorities of neighbouring countries	32	65.3%
No	17	34.7%

2.21 In case of an outbreak or increased risk, do you have a contingency plan available?

	Reported	Percentage
Yes	31	63.3%
No	18	36.7%

2.22 How are rabies control measures in your country coordinated with public health authorities?

	Reported	Percentage
Public health authorities are members of the national rabies control coordination committee	26	53.1%
No	23	46.9%
Public health authorities are members of the local rabies control coordination committee (district / county level)	18	36.7%
No	31	63.3%
Regular meetings at a ministerial / local level	24	49.0%
No	25	51.0%
Frequent exchange of epidemiological information / data	40	81.6%
No	9	18.4%
Frequent exchange of information / data on control measures	35	71.4%
No	14	28.6%
Not coordinated with public health authorities	1	2.0%
No	48	98.0%

2.23 What is done in your country to increase public awareness?

	Reported	Percentage
Education of people on rabies risks	37	75.5%
No	12	24.5%
Radio and TV spots	26	53.1%
No	23	46.9%
Provision of information material (brochures, posters, leaflets)	44	89.8%
No	5	10.2%
Organisation of World Rabies Day (WRD) activities	17	34.7%
No	32	65.3%
Other	11	22.4%
No	38	77.6%
Nothing specific	3	6.1%
No	46	93.9%

Other	Reported
a) campaign on responsible ownership; *b)* information related to travel with domestic animals	1
Campaign 'Responsible Ownership', travelling information	1
Dedicated homepage	1
Education in schools	1
Explanatory works public seminars, etc.	1
Information in the DGAV website	1
Information in the web page of the State Veterinary Administration	1
Information in websites of Veterinary and Food Board and Health Board	1
Information material published on website	1
Manual for rabies control, meetings, presentations in events or training courses	1
videos displayed on screens at the ferries terminals	1

3. Challenges

3.1 In your view what are the biggest challenges to achieve a rabies free status or to remain rabies free?

Ranked 1st	Reported	Percentage
Illegal importation of pet animals	16	32.7%
Reinfection from neighbouring infected areas	13	26.5%
Lack of funding / financial constraints	10	20.4%
Lack of capacities	2	4.1%
Illegal importation or translocation of wildlife	2	4.1%
Ineffectiveness of currently implemented programmes	1	2.0%
Emerging alien reservoir species	1	2.0%
Insufficient international support	0	0.0%
Other (rank)	0	0.0%
Total	45	

Ranked 2nd	Reported	Percentage
Lack of capacities	6	12.2%
Illegal importation or translocation of wildlife	6	12.2%
Emerging alien reservoir species	6	12.2%
Ineffectiveness of currently implemented programmes	5	10.2%
Reinfection from neighbouring infected areas	4	8.2%
Illegal importation of pet animals	3	6.1%
Lack of funding / financial constraints	2	4.1%
Insufficient international support	0	0.0%
Other (rank)	0	0.0%
Total	32	

Ranked 3rd	Reported	Percentage
Lack of funding / financial constraints	6	12.2%
Ineffectiveness of currently implemented programmes	4	8.2%
Reinfection from neighbouring infected areas	4	8.2%
Illegal importation or translocation of wildlife	4	8.2%
Insufficient international support	3	6.1%
Illegal importation of pet animals	3	6.1%
Emerging alien reservoir species	3	6.1%
Lack of capacities	1	2.0%
Other (rank)	1	2.0%
Total	29	

Other	Reported
Challenges of implementation of the stray dog population control programmes at the local level/municipal authorities	1
Lack of epidemiological assessment	1
Reduced passive surveillance programme	1
Unwillingness of neighbouring infected country to implement effective ORV programme	1

3.2 Do you consider the work being carried out by the OIE sufficient to make a difference in the elimination of both canine and wildlife rabies in the region?

	Reported	Percentage
Yes	39	79.6%
No	7	14.3%
No answer	3	6.1%

3.3 Are there any rabies-related issues you wish the OIE to consider or address in the near future that might help your country to facilitate rabies control and elimination?

	Reported	Percentage
Free text	16	32.7%
Other	4	8.2%
No answer	29	59.2%

3.4 Are you aware of the WHO/OIE/FAO tripartite initiative aimed at 'eliminating human dog-mediated rabies by 2030'?

	Reported	Percentage
Yes	46	93.9%
No	3	6.1%