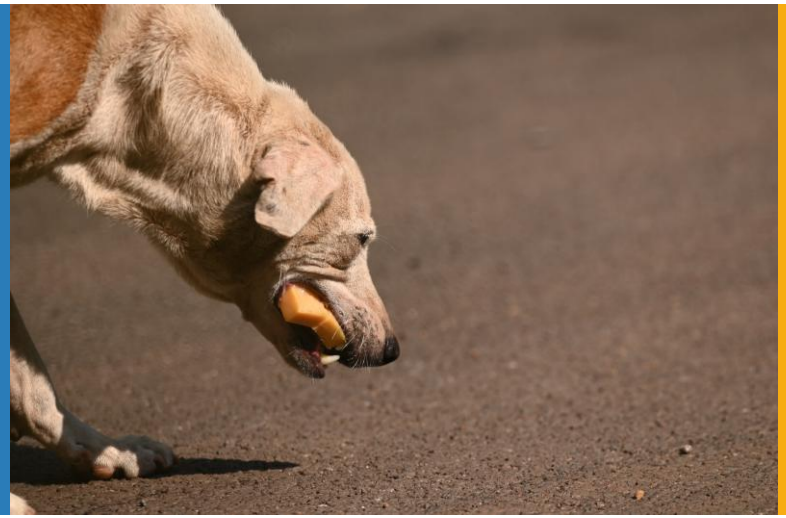
Oral Rabies Vaccination of Dogs



Ad Vos

Blantyre - Malawi, 23 April 2026

ORAL RABIES VACCINATION (ORV) OF DOGS

Agenda:

- **ORV application in planning**
- **Field implementation**
- **Field studies and campaigns**

Part 1

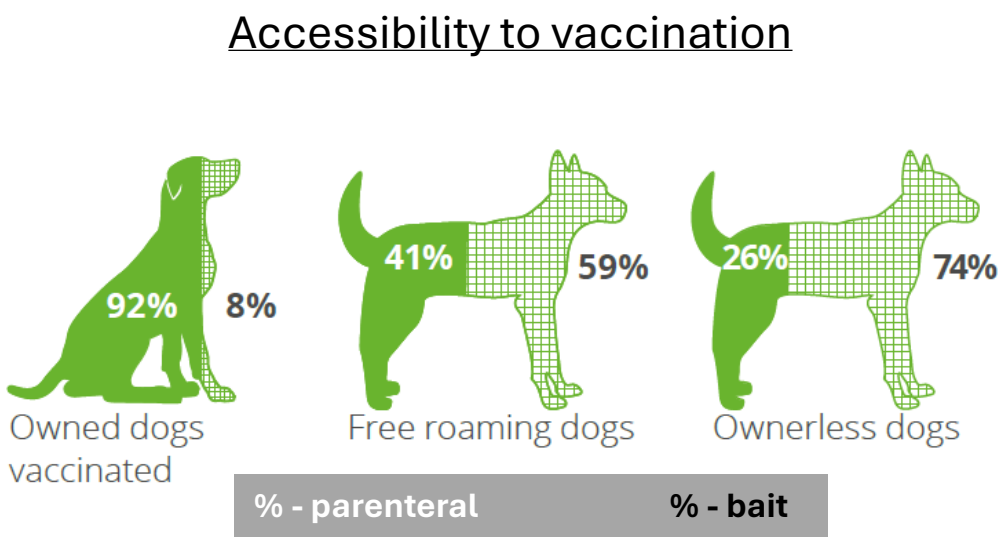
ORV application in Planning

Oral Rabies Vaccination: Planning

Why ORV: To increase vaccination coverage of esp. free roaming dogs

Quantitative effect of (complementary) ORV to vaccination coverage

But it is a different story in another location …



Data from Kusadasi, Türkiye

Oral Rabies Vaccination: Planning

Quantitative effect of (complementary) ORV to vaccination coverage

Istanbul - Türkiye

Vaccination coverage (%)	Sarigazi district	Ferhatpasa district
Prior to campaign	18.0	15.5
Campaign at clinic (central point)	21.8	-
Door-to-door	22.8	40.5
Sub-total coverage without ORV of dogs	62.6	56.0
Oral campaign	**21.2**	**18.1**
Total coverage inc oral	**83.8**	**74.1**

Owned, ownerless, community dogs
Both restricted and free-roaming

Oral Rabies Vaccination: Planning

Quantitative effect of (complementary) ORV to vaccination coverage

Mindoro, Philippines

All dogs owned but also free-roaming

	vaccination coverage
before D2D campaign	0%
after campaign	76%*
- parenteral	(9%)
- oral	(67%)

* - puppies not included

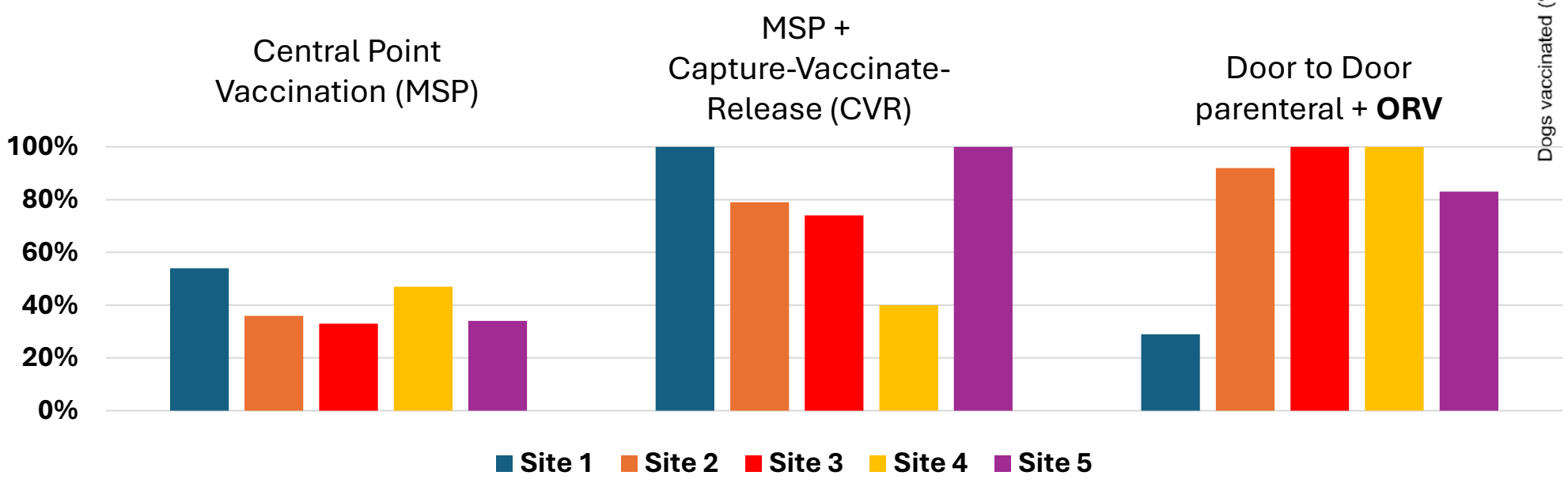
Oral Rabies Vaccination:Planning

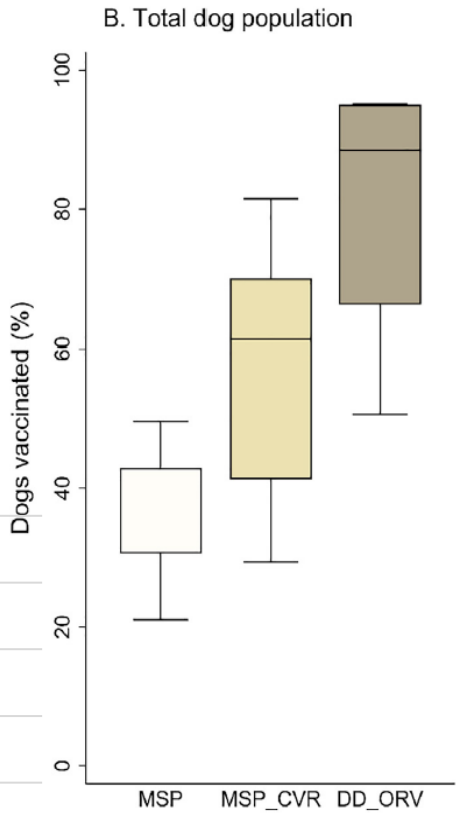
Quantitative effect of (complementary) ORV to vaccination coverage

Owned, ownerless, community dogs
Both restricted and free-roaming

Croix-des-Bouquets, Haiti - 2016

vaccination coverage (%) by method





In collaboration with CDC, Atlanta, USA

Oral Rabies Vaccination: Planning

Getting started:

1) **Select vaccine**
2) **Select bait**
3) **Select distribution system**

Oral Rabies Vaccination: Planning

Vaccine

EFFICACY

SAFETY

- Target and non-target species
- Genetic stability
- Humans

Requirements	Target species	Non-target species				
	Dogs	Cats	(Wild) rodents	Suckling mice#	SCID nude mice	Humans
Repeated dose	×					
Overdose	×	×	×			
Dissemination	×					
Shedding (saliva)	×					
Horizontal transmission	×		×			
Reproductive performance (vertical transmission)	×					
Genetic stability (increase in virulence)				×		
Immunocompromised host					×	
Biological properties (of vaccine strain)*	×					
Risk or genetic reassortment*	×					
Risk assessment						×
Likelihood of contacts						×

Key:

* for BDVs only

\# serial passaging

animal studies

non-animal studies / other tests

× test required by WOAH

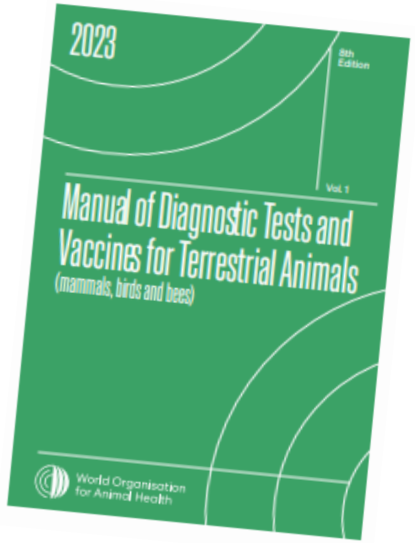
× test required by EMA

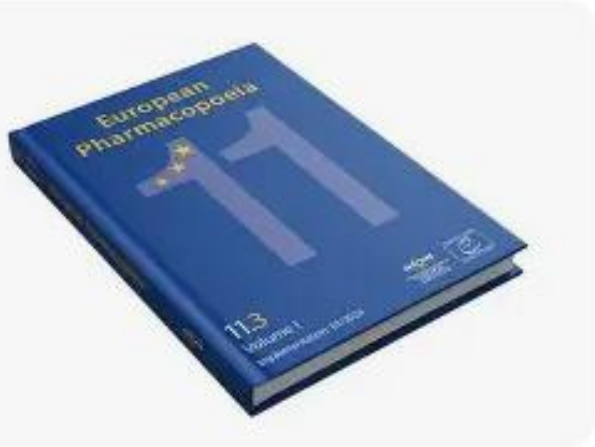
× test required by both

Definitions:

SCID: severe combined immunodeficiency genetically affecting both B and T cells

Nude mice: specimens with a genetically inhibited immune system due to a greatly reduced number of T cells





Oral Rabies Vaccination: Planning

Bait

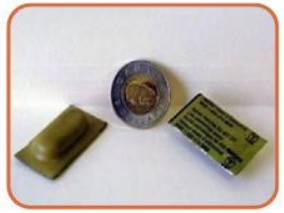
The bait should not only be very attractive but also ensure timely release of the vaccine in the oral cavity

most likely not vaccinated

Meatball (köfte) bait

Boiled intestine bait

Egg-based bait



Coated sachet

Fish meal coated sponge bait

Blister pack coated with fish meal and fat

definitely vaccinated

Bait distribution system: Three major systems

distribution by directly offering dogs encountered a bait

:

distribution of baits to dog owners

distribution of baits at selected sites

Oral Rabies Vaccination: Planning

SITUATIONS FOR ORV

The use of **oral rabies vaccines (ORV)** is particularly beneficial in scenarios where traditional injectable vaccination methods are challenging or impractical.

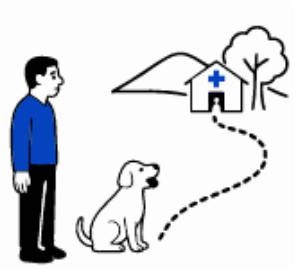
The following situations represent ideal conditions for ORV implementation:

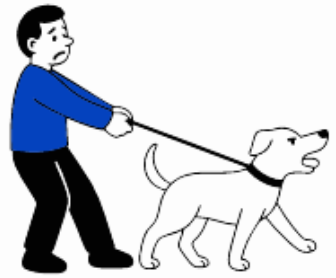
Difficult-to-Handle Dogs:
Dogs that cannot be restrained for injectable vaccines due to fear, aggression, or lack of socialization (guarding, herding, protection).

Free-Roaming Dogs:
Populations of stray or semi-owned dogs that cannot be handled.

Limited Veterinary Facility
Areas, especially rural or remote regions, where veterinary clinics and professionals are scarce, making injectable vaccination programs difficult to implement.

Owner Constraints Due to Distance:
When dog owners cannot travel to veterinary clinics because of long distances or lack of transportation.





Owner Constraints Due to Handling Issues:
When dog owners are unable to physically restrain their dogs for injectable vaccination, ORV is a practical alternative.

Part 2

Field implementation

Oral Rabies Vaccination: Field implementation

Pre-campaign activities

- vaccine baits procurement, shipment and storage
- selection of vaccination area and – period
- logistics and supportive material
- awareness campaign
- training vaccination teams

Campaign

- monitoring adverse events (human/animal)

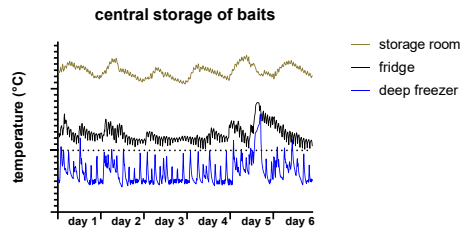
Post-campaign activities

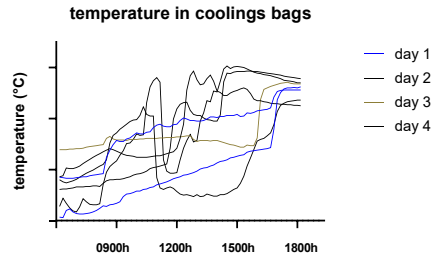
- Data evaluation
- Follow-up adverse events reports

Oral Rabies Vaccination: Field implementation

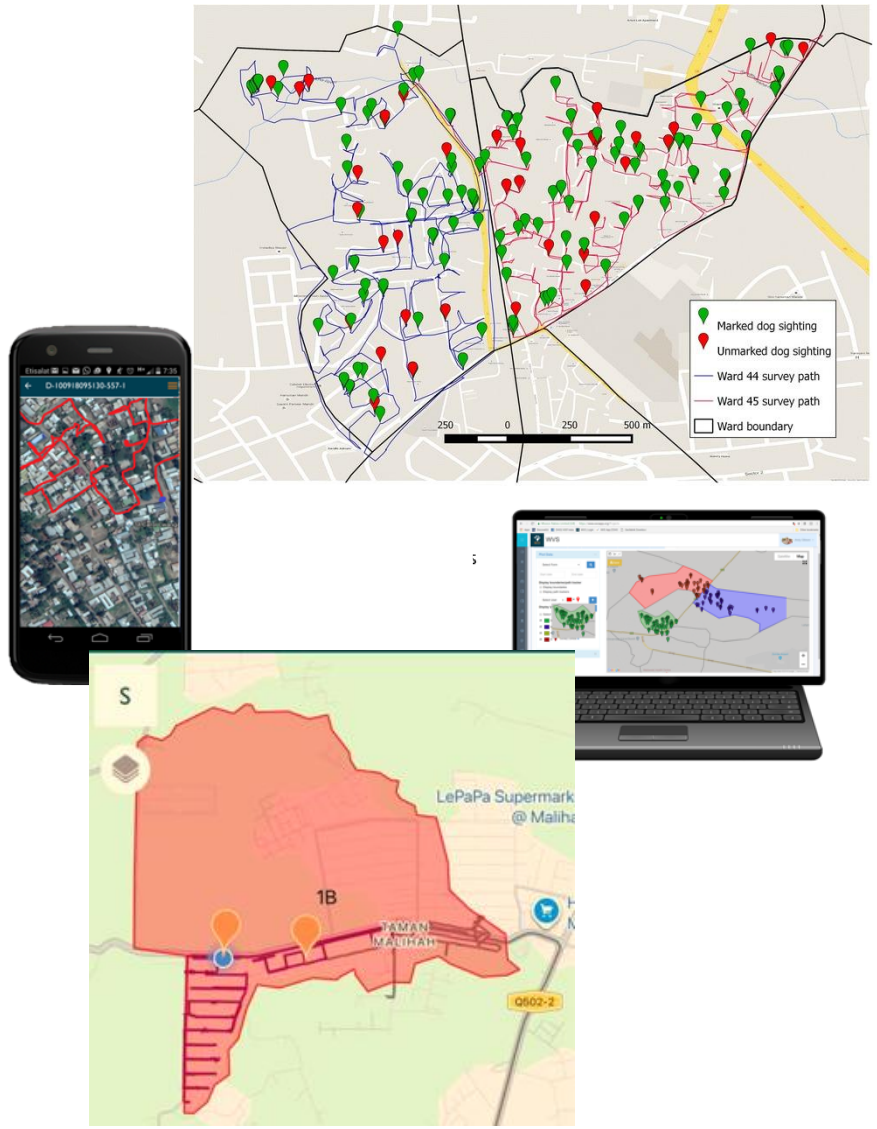
Vaccine baits

- procurement
  - direct, tender, vaccine bank, etc.
- Import permit / license
- Shipment
- Cold chain





Oral Rabies Vaccination: Field implementation



Selection of vaccination areas

- Indentify areas to target:
  - Systemic coverage
  - Hot spots
    - epidemiological
    - free-roaming dogs

- Select the best period of the year and day: e.g.
  - not in rainy season
  - most free-roaming dogs are active early morning and late afternoon

Oral Rabies Vaccination: Field implementation

Selection of ORV distribution strategy/system

- CPV + D2D (only ORV)
- D2D combination of parenteral and ORV
- D2D only ORV

- Distribution of baits directly to dogs encountered
- Distribution of baits to dog owners
- Distribution of baits at selected sites to reach feral dogs

Oral Rabies Vaccination: Field implementation

Logistics

Transport: How are the vaccination teams moving around?

on foot

scooter

car

depends on local settings: distance to cover, type of habitat, etc.

Oral Rabies Vaccination: Field implementation

Supportive material

- Cool boxes
- Coolpacks
- Examination gloves
- Garbage bag
- Desinfectant
- Leaflets (with contact details)
- Mobile phone + App

Oral Rabies Vaccination: Field implementation

Awareness Campaigns

WHO
- General public (esp. school children)
- Public - and Animal Health section
- local authorities

WHY
- obtain community support
- avoid misunderstandings (poisoning)
- prevent human contacts with vaccine
- inform public health sector how to make a risk assessment (SOP – vaccine contact)

HOW

newspapers, banners, [local radio & tv] announcements, megaphone, posters, social media, school visits, etc.

Oral Rabies Vaccination: Field implementation

Training

- How to work safely
- How to approach and offer a bait to a dog
- How to observe and record bait handling

Oral Rabies Vaccination: Field implementation

Human Safety

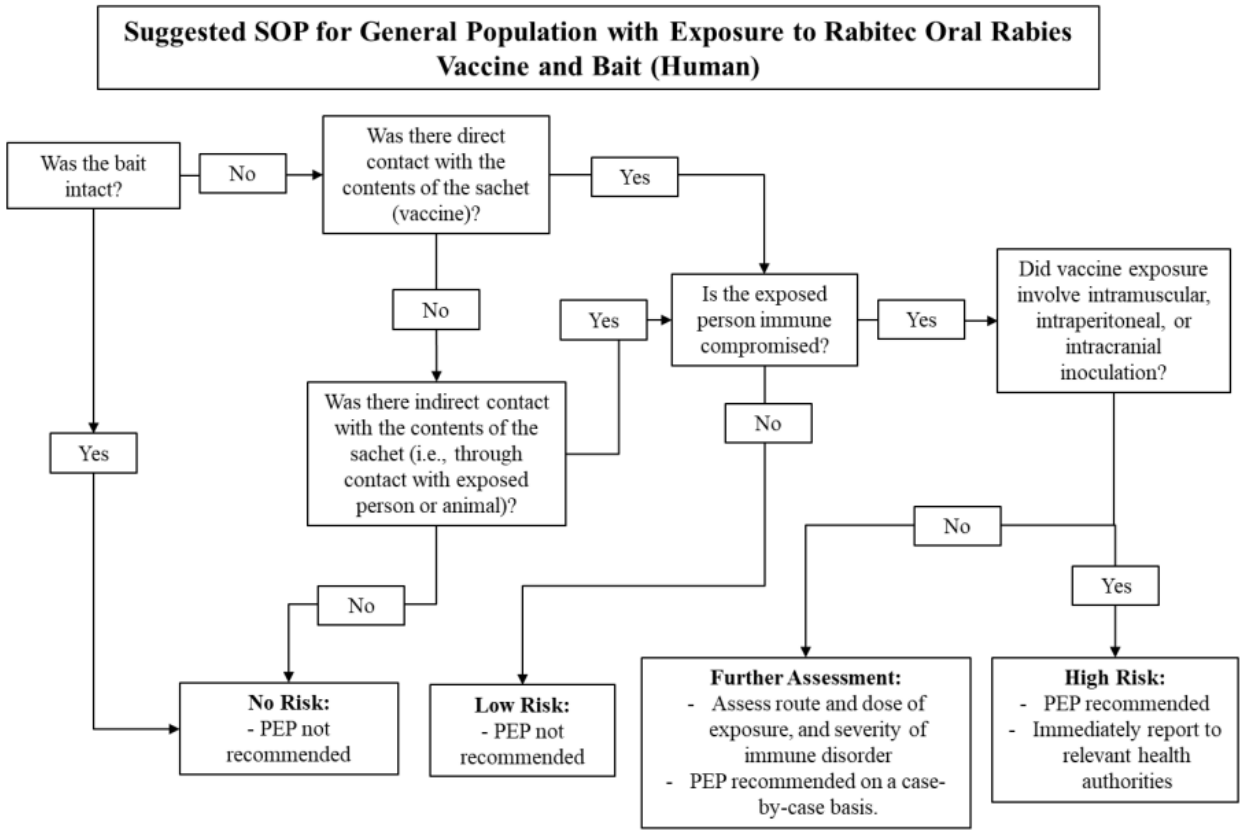
During campaign

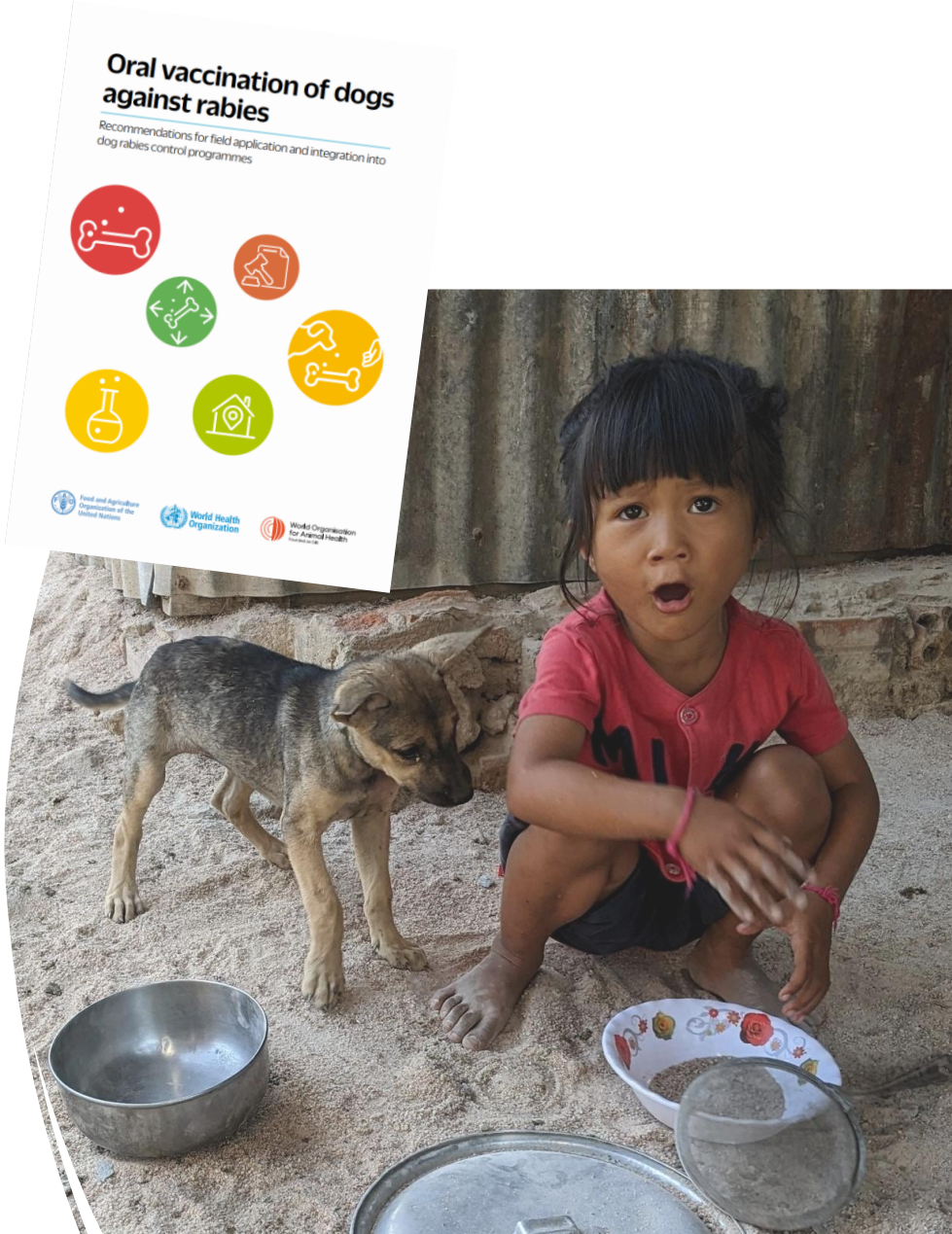
- **Vaccinators**
- **Public**

Oral Rabies Vaccination: Field Implementation

Monitoring Adverse Events

What to do when humans have contact with the vaccine virus





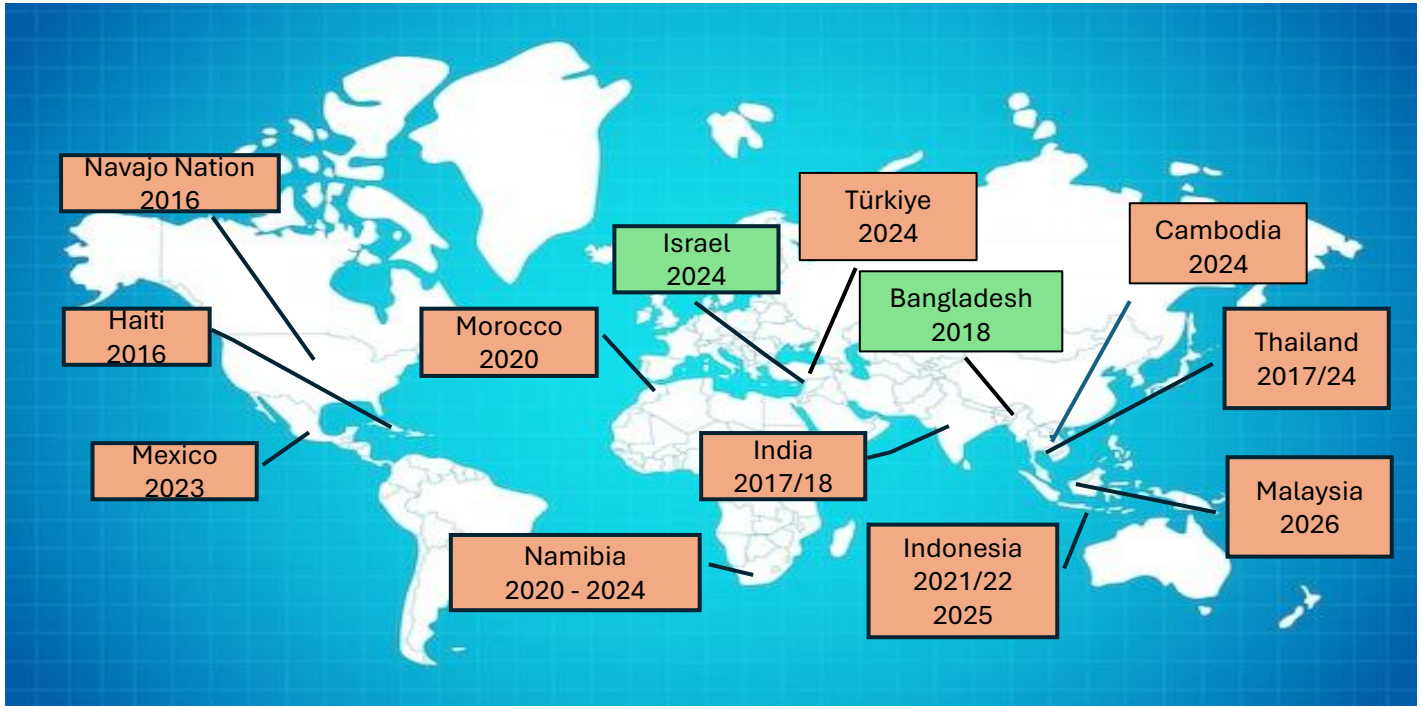
Part 3

Field experience

Oral Rabies Vaccination: Field Experience

Country	Year	Bait acceptance	Serology	Campaign
Navajo Nation	2016	x		
Haiti	2016		x	
India	2017/18	x		
Thailand	2017- 2024	x	x	x
Bangladesh	2018	x		
Namibia	2020 - 2024		x	x
Morocco	2020	x	x	
Indonesia	2021/22 2025	x	x	x
Mexico	2023	x	x	
Cambodia	2024	x	x	
Israel	2024	x		
Türkiye	2025			x
Malaysia	2026			x

Recent Field trials – ORV of dogs

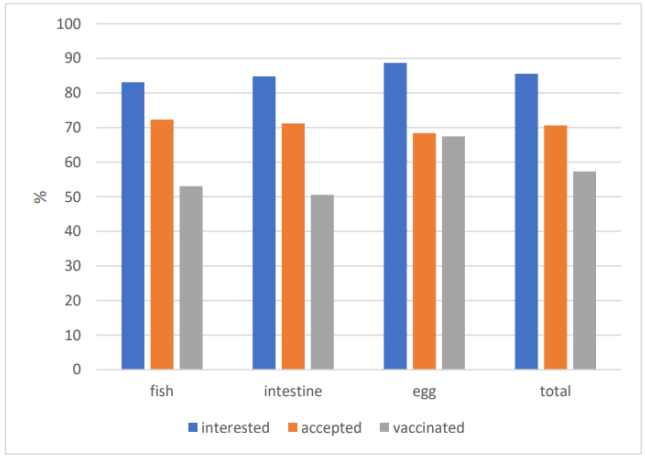


Oral Rabies Vaccination: Field Experience

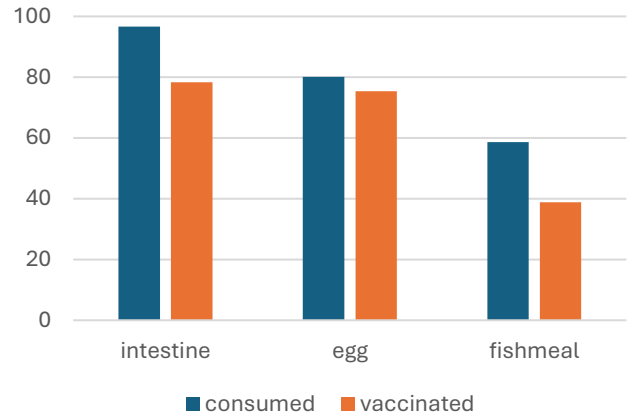
Bait acceptance studies

Intestine fish meal egg

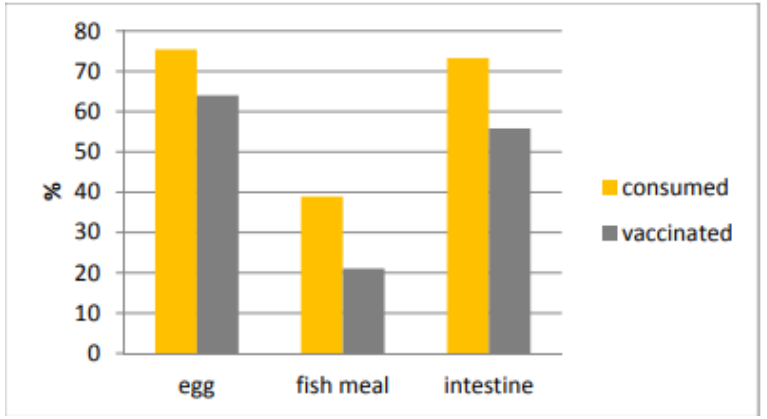
Mexico



Bali - Indonesia



Thailand



Morocco

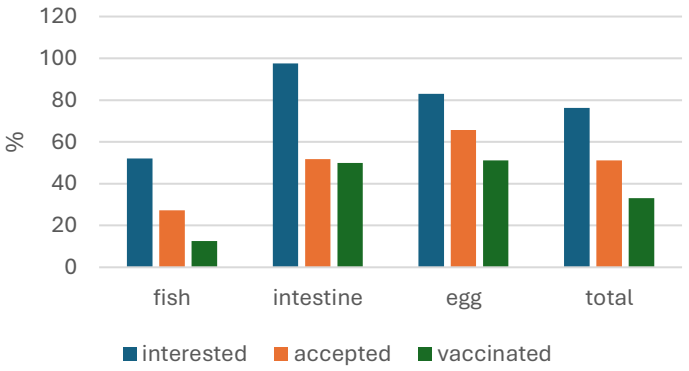


Figure 2. A dog offered an egg(-flavored) bait (**a**) (© R. Marquez) and the blue-coloring of the oral cavity after bait consumption (**b**) (© A. Langguth).

Immunogenicity: field studies – seroconversion rate

Country	dpv	ELISA		SNT		Reference
		n/N	%	n/N	%	
Haiti	17	22/29	79	5/27	18.5	(Smith et al. 2019)
Namibia	28/56	16/21	76.2	10/21	47.6	(Molini et al. 2021)
Morocco	450	16/19	84.2	7/19	36.8	(Aboulfidaa et al. 2024)
	643	12/15	80.0	2/11	18.2	
	723	12/12	100	4/12	33.3	
	788	12/13	92.3	4/13	30.8	
	1088	4/8	50.0	2/8	25.0	
Indonesia	27-32	40/45	88.9	n.d.		(Megawati Saputra et al. 2023)
Mexico	34-37	20/22	90.9	n.d.		(Gutiérrez Cedillo et al. 2023)
Cambodia	30	32/35	91.4	n.d.		unpublished
	90	15/22	68.2	n.d.		

Oral Rabies Vaccination: Field Experience

Thailand - 2020

viruses

MDPI

Article

Feasibility and Effectiveness Studies with Oral Vaccination of Free-Roaming Dogs against Rabies in Thailand

Karoon Chanachai [1,*], Vilaiporn Wongphruksasoong [2], Ad Vos [3,*], Kansuda Leelahapongsathon [4], Ratanaporn Tangwangvivat [5], Onpawee Sagarasaeranee [2], Paisin Lekcharoen [6], Porathip Trinuson [2] and Suwicha Kasemsuwan [4]

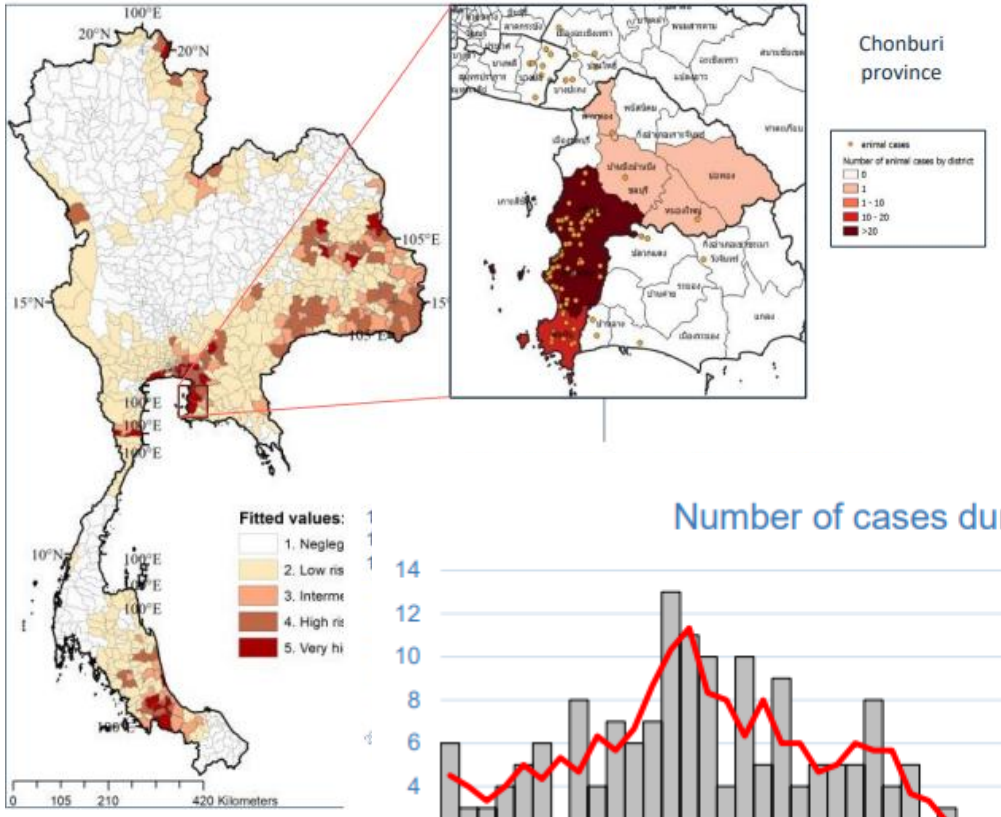
Table 2. Achieved oral rabies vaccination coverage in the free-roaming dog population at the identified sites in 5 study areas.

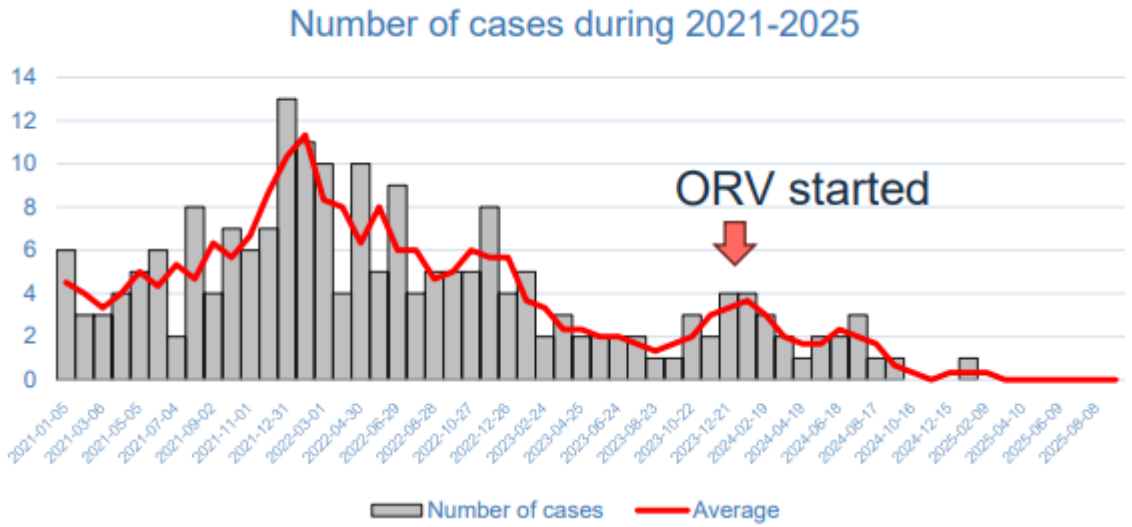
Study Area	Nr. of Sites	Nr of Inaccessible Dogs	Dogs Approached (% [*n*/N])	Dogs Accepting the Bait & Successfully Vaccinated (% [m/M])	Vaccination Coverage Achieved (%) *
Choen Noen	59	488	77.5 (378/488)	88.1 (310/352)	68.2
Cha Um	59	789	71.7 (566/789)	79.5 (387/487)	57.0
Phe	112	564	86.5 (488/564)	81.9 (381/465)	70.9
Thong Song	77	456	87.7 (400/456)	81.2 (315/388)	71.2
Tapraya	31	147	66.7 (98/147)	94.9 (92/97)	63.2
Total	338	2444	79.0 (1930/2444)	83.0 (1485/1789)	65.6

* vaccination coverage achieved (%) was calculated as follows: 100(*n*/N * m/M).

Oral Rabies Vaccination: Field Experience

Thailand - 2024





Target population: free-roaming community and stray dogs

District	No. of areas	No. of targeted dogs	No. of parenteral Vaccine	No. of ORV	Average vaccine Coverage
Banglamung	86	1,565	179	734	70.64
Siracha	202	5,244	220	4,369	85.35
Sattahip	96	3,374	19	2,682	80.88
Total	384	10,183	418	7,785	80.95

Source: Weerapong Thanapongtharm Department of Livestock Development, Thailand presented at United Against Rabies Meeting, 7 – 9 October 2025, Bangkok, Thailand

Oral Rabies Vaccination: Field Experience

Namibia

ORV of dogs

2020 - Introduction ORV of dogs during WOAH Stakeholder meeting
- immunogenicity study (collaboration with UNAM & FLI)

2021 - ORV feasibility study - Oshana

2022 - Large scale campaign – Zambezi (4,000 baits)

2024 - Large scale vaccination – Zambezi (10,000 baits)

One Health 16 (2023) 100562

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/onehlt

Emergency response using oral rabies vaccination of dogs –field data from Namibia demonstrate high efficiency

Conrad M. Freuling [a,*], Frank Busch [b], Mainelo Beatrice Shikongo [c], Nzwana Silume [c], Jolandie van der Westhuizen [d], Siegfried Khaiseb [d], Albertina Shilongo [e], Thomas Müller [a]

PLOS NEGLECTED TROPICAL DISEASES

RESEARCH ARTICLE

Oral rabies vaccination of dogs—Experiences from a field trial in Namibia

Conrad Martin Freuling[1]*, Frank Busch[2], Adriaan Vos[3], Steffen Ortmann[3], Frederic Lohr[4], Nehemia Hedimbi[5], Josephat Peter[6], Herman Adimba Nelson[7], Kenneth Shoombe[8], Albertina Shilongo[9], Brighton Gorejena[10], Lukas Kaholongo[10], Siegfried Khaiseb[11], Jolandie van der Westhuizen[11], Klaas Dietze[2], Goi Geurtse[12], Thomas Müller[1]

scientific reports

OPEN

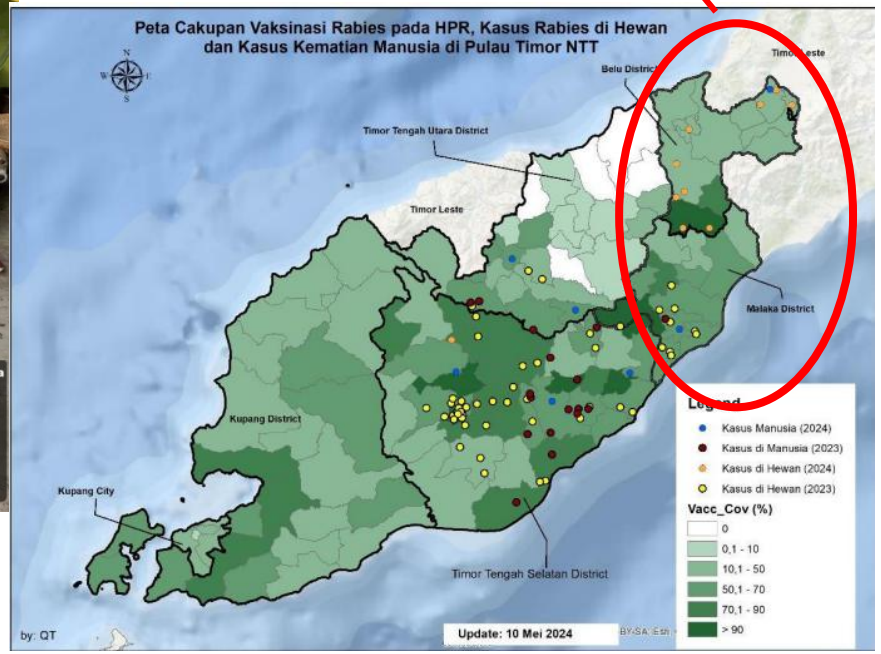
Evaluating the 2024 dog oral rabies vaccination campaign in the Zambezi region, Namibia using GIS and household surveys

Conrad M. Freuling[1], Mainelo Beatrice Shikongo[2], Frank Busch[3], Sarah Gottlieb[4], Reinhold Haimbodi[5], Naindji Haindongo[5], Chantal Hansen[6], Juliet Kabajani[6], Joseph Kapapero[5], Muesee Kasaona[6], Mattia Marconcini[7], Jeremia Namusheshe[2], Nzwana Silume[2], Tenzin Tenzin[8], Ad Vos[9] & Thomas Müller[1]

Oral Rabies Vaccination: Field Experience

West Timor, Indonesia 2025

Mass Dog Vaccination, incl. ORV in Belu and Malaka District



In collaboration with Mission Rabies

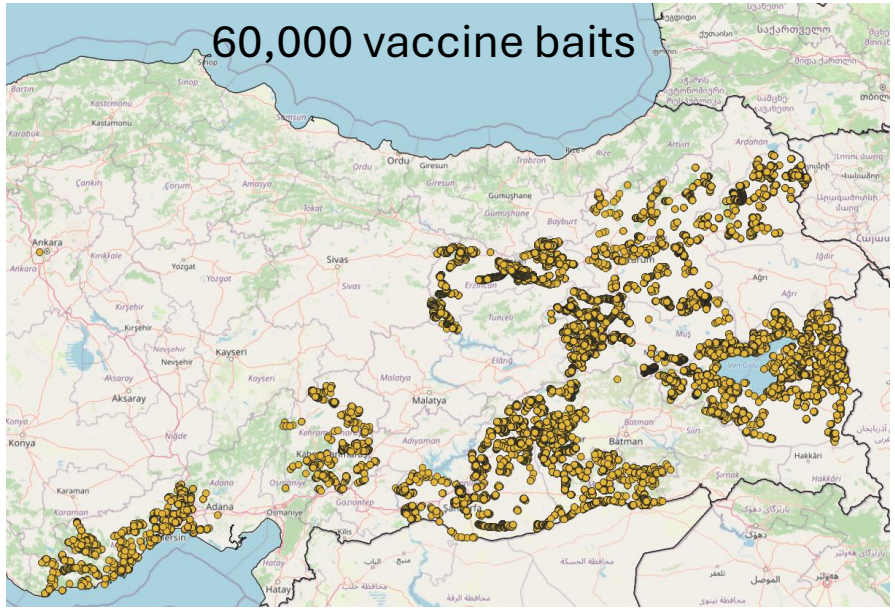
Oral Rabies Vaccination: Field Experience

Türkiye – 2025

Rabies positive cases 2025

dog
cattle
sheep

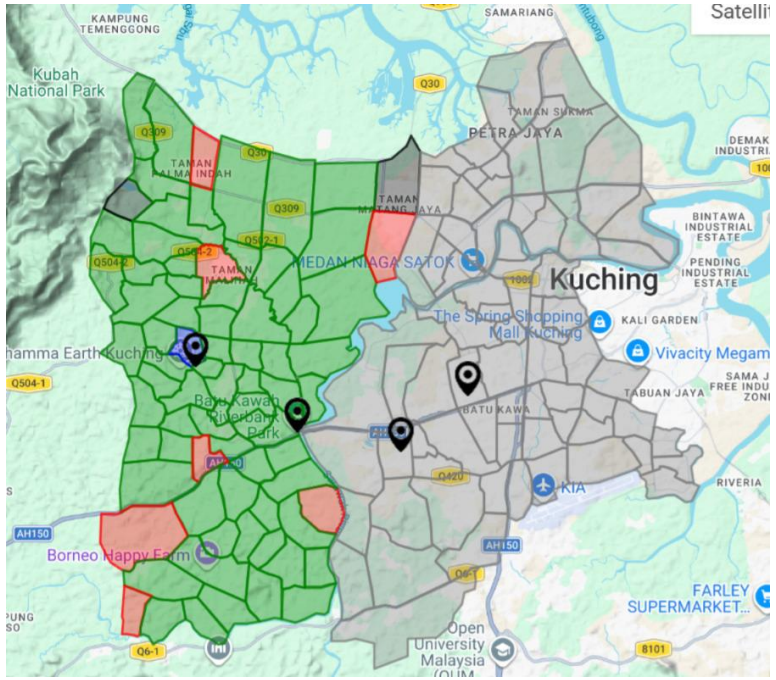
Location of orally vaccinated dogs

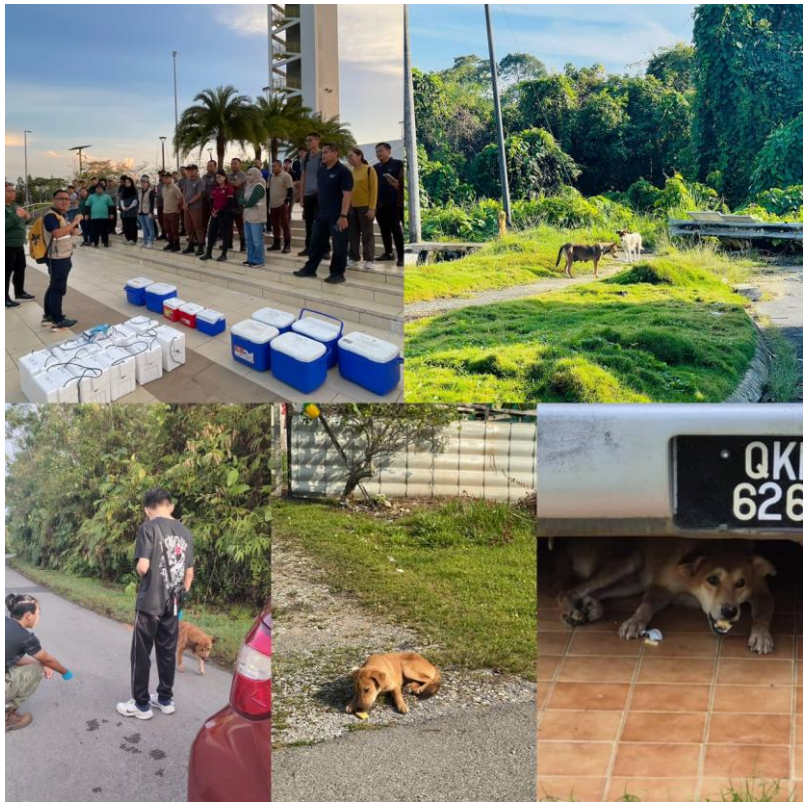


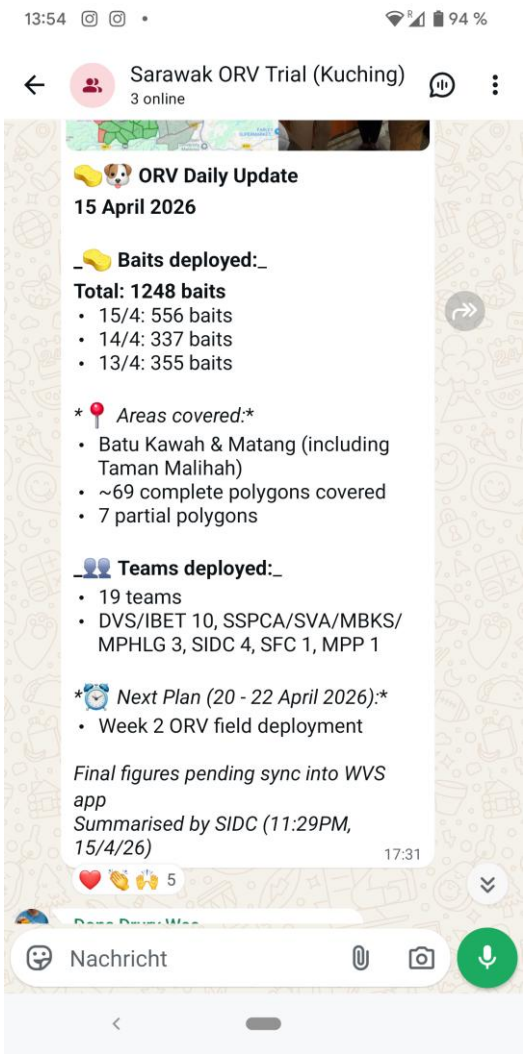
Oral Rabies Vaccination: Field Experience

Sarawak, Malaysia - 2026

CPV (parenteral) and
D2D (parenteral and/or oral)







In collaboration with Mission Rabies

Oral Rabies Vaccination: Summary

ORV as a complementary tool for parenteral vaccination of (free-roaming) dogs

- a higher vaccination coverage is achieved (more free-roaming dogs can be reached)
- less time and manpower is needed
- less risk of bite incidents for vaccinators
- less stress (incl. injuries) for dogs (animal welfare)

Thank You