

SAFETY AND EFFICACY OF USING ORAL RABIES VACCINES IN DOGS FROM FIELD STUDIES IN THAILAND

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OIE Virtual Workshop on Oral Rabies Vaccines (ORVs)
28 February 2022



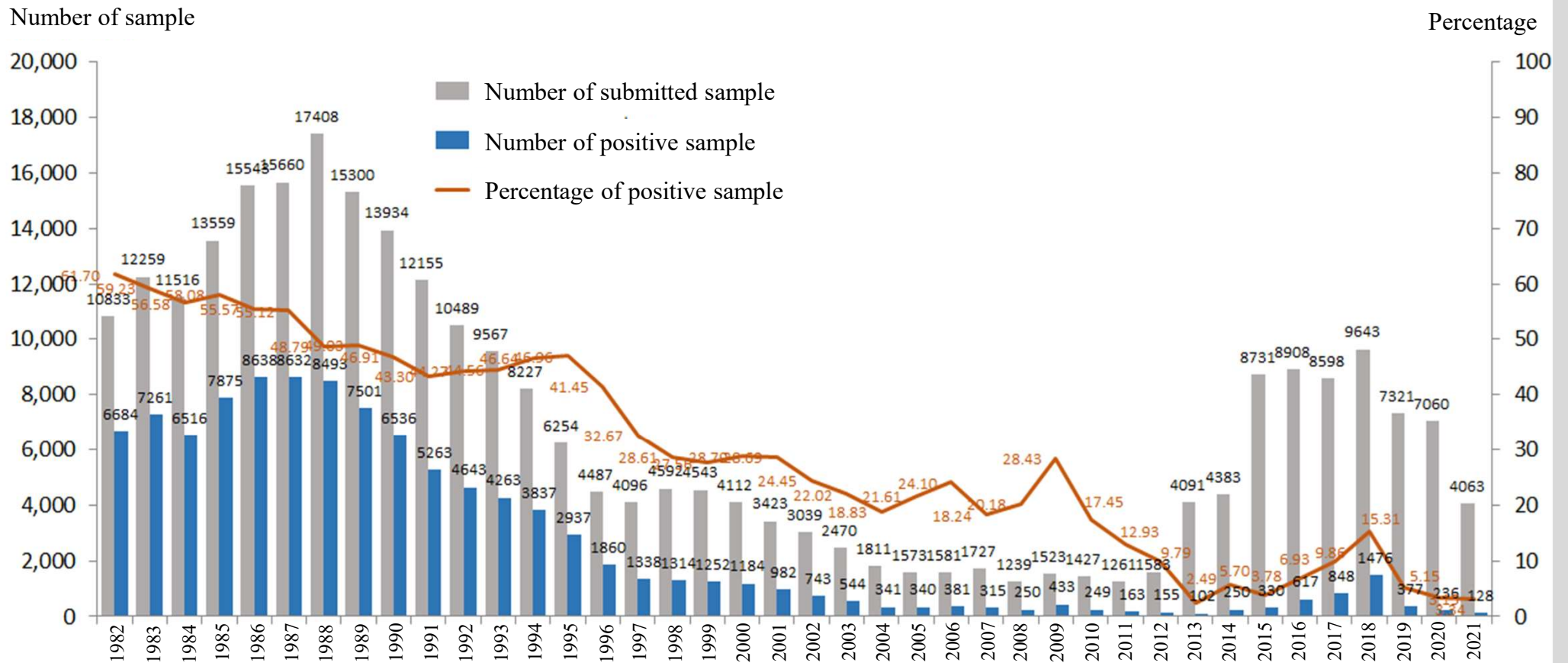


Outline

- Animal rabies situation and free-roaming dogs in Thailand
- Overall framework of oral rabies vaccine study in Thailand and the field trial studies in free-roaming dogs
- Safety of oral rabies vaccines



Animal Rabies situation in Thailand, 1982 - 2021



Data source: Thai Rabies Net, Department of Livestock Development, Thailand



Free-roaming dogs in Thailand



Framework for oral rabies vaccine (ORVs) study in Thailand

Bait acceptance
study

Feasibility and
Effectiveness study

Phase 1

Phase 2

Phase 3

Phase 4

Antibody response
study

Nationwide feasibility
and antibody response
study



OIE terrestrial 2018, Chapter 2.1.17:

“Apart from mass parenteral vaccination (carried out concurrently or sequentially), the use of **oral vaccination, especially in free-roaming and inaccessible dogs**, taking into account structure and accessibility of the dog population, should represent **a complementary measure for the improvement of the overall vaccination coverage** in dog rabies control programmes.”



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Egg-flavored and fishmeal baits



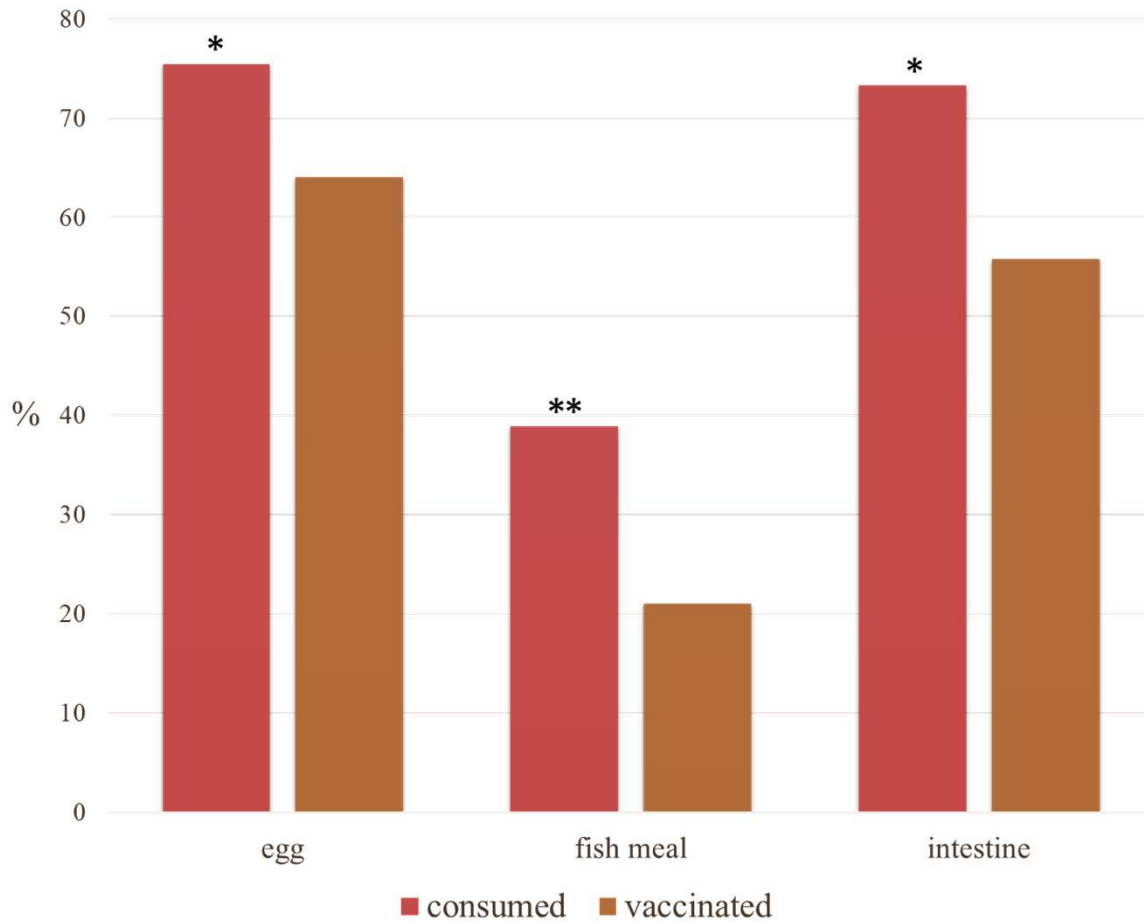
Intestine baits (in collagen cases)

Phase 1 Bait acceptance study

- Free-roaming dogs in Kamphaeng Saen campus of the Kasetsart University, and the surrounding temples in Nakhon Pathom province
- Three different bait types
 - 206 fishmeal baits (brown)
 - 196 egg-flavored baits (yellow)
 - 206 boiled pig intestine in collagen cases



The percentage of dogs consuming the offered bait type and were subsequently considered vaccinated



Phase 1 Bait acceptance study



- Assessment
 - Bait acceptance: direct oral contact
 - Consumption and handling
 - Vaccinated: dyed-water was released in the oral cavity of the dog





Dog shelter in Taptan, Uthai-Thani province, Thailand

Phase 2 Antibody response study

- ORV: Live Attenuated rabies virus strain SPBN GASGAS (Ceva Santé Animale, Germany)
- 46 young dogs (26 males and 20 females) at the Bangkok Metropolitan Administration's dog shelter in Taptan, Uthai-Thani province



D1	D3	D5	D7	D9	D11	D14	D15	D18	D20	D21	D23	D25	D27	D29	D31	D34	D36	D37	D39	D41	D43	D45	D45
										B		B	B	B	B	B	B				C	C	C
D2	D4	D6	D8	D10	D12	D13	D16	D17	D19	D22	D24	D26	D28	D30	D32	D33	D35	D38	D40	D42	D44		
B			B	B	B	B	B	B	B	B		B	B	B	B	B	B				C		

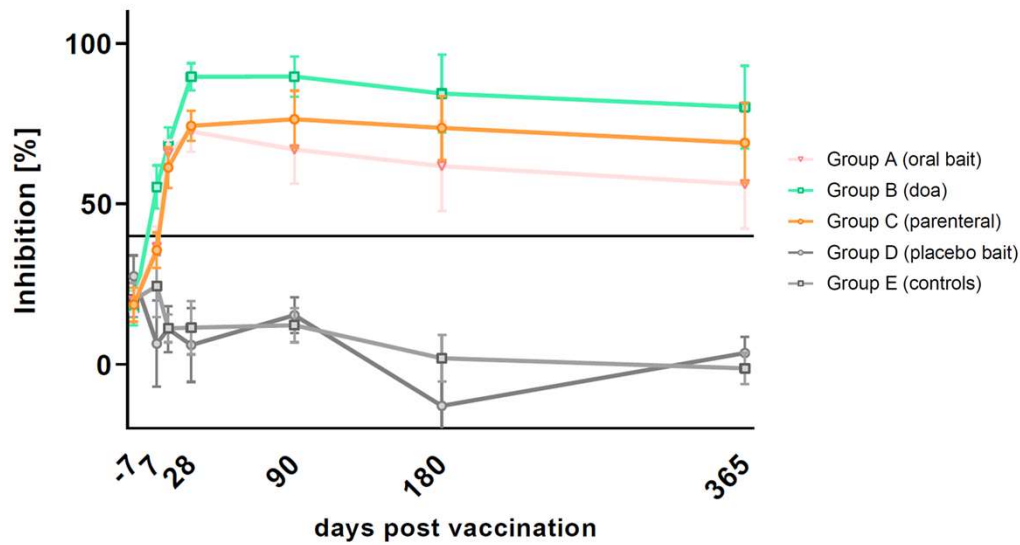


- B** Placebo (PBS) with Bait 7 dogs
- RABITECD/DOA 10 dogs
- B** RABITEC D/Bait/Blister 15 dogs
- Bayovac/SC 10 dogs
- C** Control 4 dogs

Cage allocation of experimental dogs

Boiled pig intestine bait and vaccine sachets

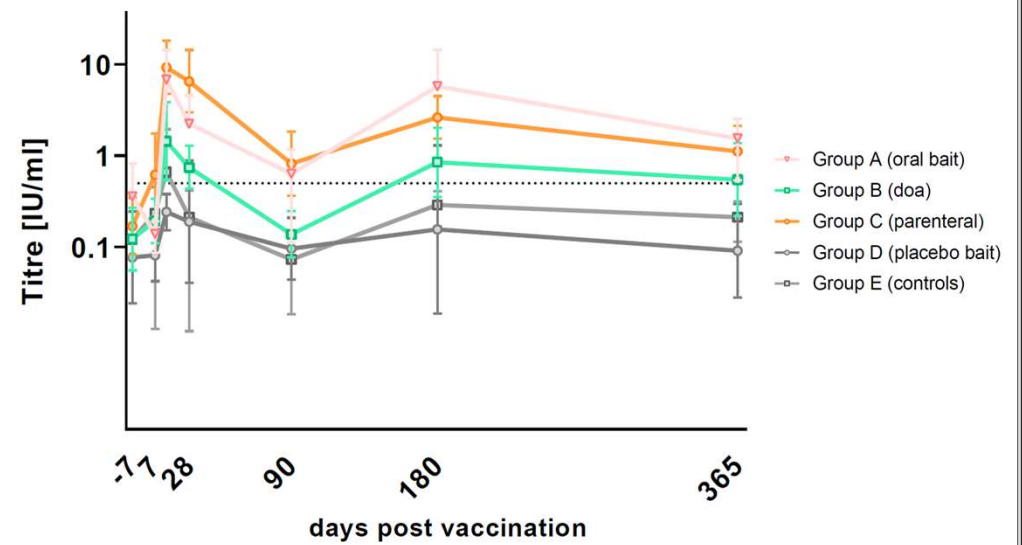




Rabies binding antibody (rVBA)

ELISA

Mean percent inhibition with standard deviation

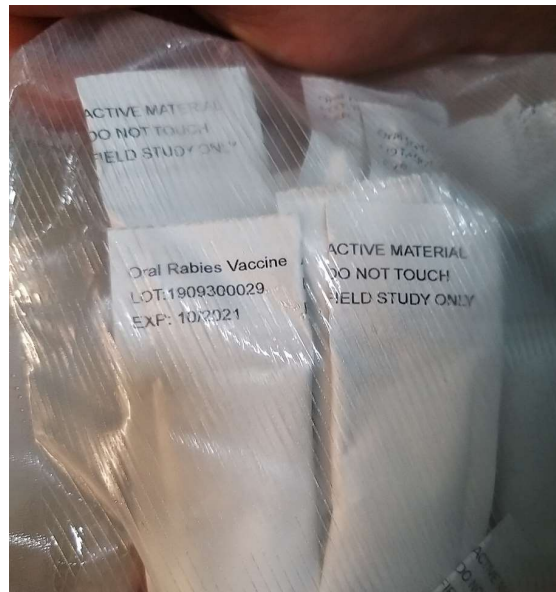


Rabies virus neutralizing antibodies (rVNA)

Rapid Fluorescent Focus Inhibition Test (RFFIT)

Geometric mean titer with standard deviation





Egg baits and intestine baits

Phase 3 Feasibility and Effectiveness study

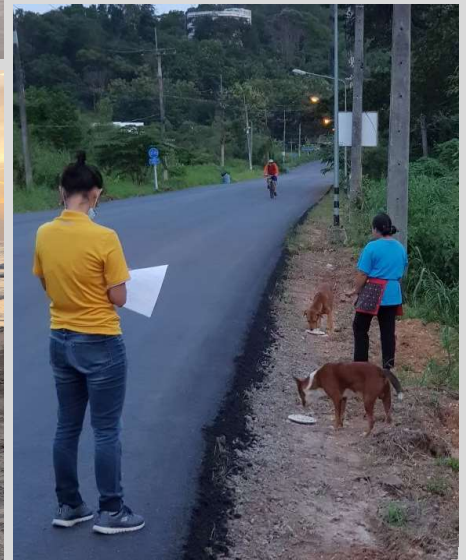
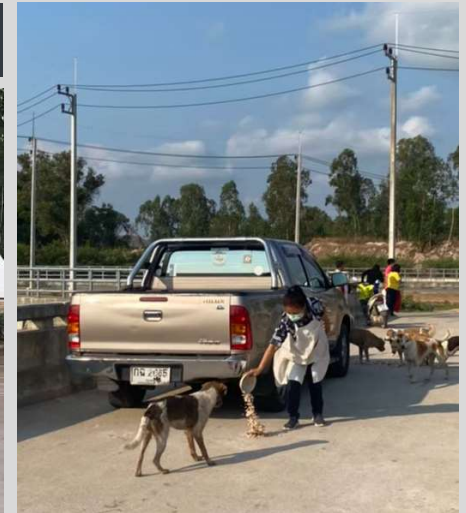
- SPBN GASGAS vaccine (Ceva Innovation Center GmbH, Dessau in Germany)
- Egg bait (commercial), pig intestine bait (local made), and Egg+ bait (cat liquid snack pasted on egg bait)
- 5 study areas
 - Choeng Noen municipality, Rayong
 - Phe municipality, Rayong
 - Cha Um municipality, Phetchaburi
 - Thung Song municipality, Nakhonsrithammarat
 - Tapraya, Sa Kaeo

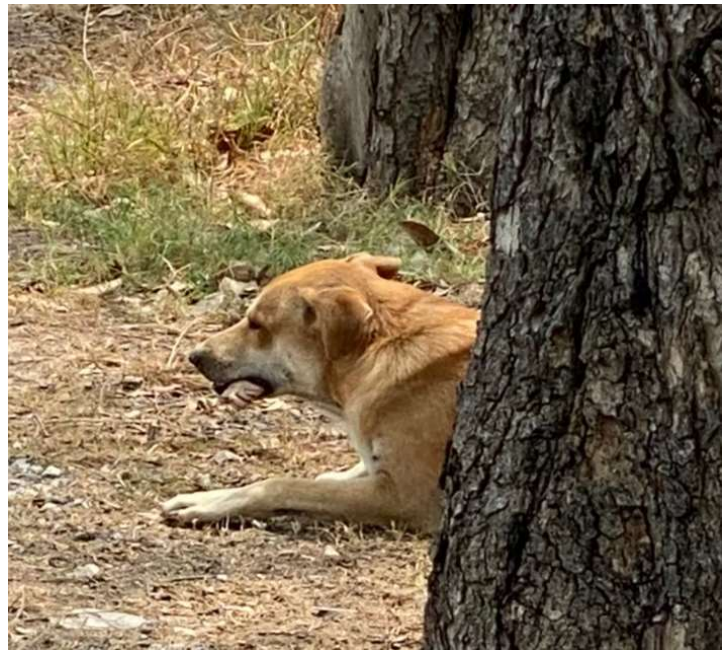


ORV campaign



5 study areas





Percentage of dogs interested in bait offered, dogs that chewed very shortly (<10 s), swallowed the sachet and considered vaccinated per bait type offered

Bait Type	No. of Dogs Offered a Vaccine Bait	No. of Dogs Interested in Bait (% [n/N]) *	Sachet Swallowed (% [n/N])	Chewing Time (<10 s) (% [n/N])	Vaccinated ** (% [n/N])
Intestine	1314	92.9 (1209/1302)	80.0 (929/1161)	42.5 (480/1130)	82.0 (995/1214)
Egg	338	87.3 (288/330)	32.2 (88/273)	24.0 (58/242)	83.6 (255/305)
Egg+	278	92.8 (256/276)	26.5 (65/245)	24.6 (60/244)	87.0 (235/270)
total	1930	91.9 (1753/1908)	64.4 (1082/1679)	37.0 (598/1616)	83.0 (1485/1789)

Oral rabies vaccination coverage in the free-roaming dog population 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: $100 (n/N * m/M)$.



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12 study areas



Phase 4 Nationwide feasibility and antibody response study

- SPBN GASGAS vaccine (Ceva Innovation Center GmbH, Dessau in Germany)
- Egg bait and Egg+ bait (cat liquid snack pasted on egg bait)
- 12 study areas in all region of Thailand
- Serological monitoring following ORV in 5 study areas





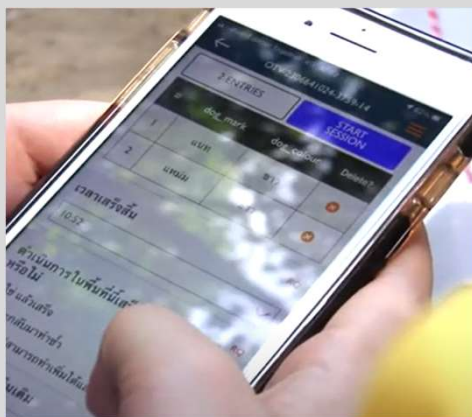
อุปกรณ์การให้วัคซีนป้องกันโรคพิษสุนัขบ้า

VDO วัคซีนป้องกันโรคพิษสุนัขบ้า

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WVS
Oral Rabies Vaccination Pilot
←
OTV-C-2002651937-3625-0
☰

Page 1

Local Administrative Org ชื่อท้องถิ่น (เช่น ทต.กำแพงแสน)

Start

Review Data

Chat Forum

Project Info

News

Catching/Release

Location RQ

Province จังหวัด

SELECT ONE

District อำเภอ

SELECT ONE

Subdistrict ตำบล

SELECT ONE

Name of Location RQ ชื่อสถานที่ (เช่น วัดทุ่งกระพังโหม, 7-11 หน้ามหาวิทยาลัย.. ฯลฯ)

WVS Data Collection App



Percentage of bait consumption and subsequently considered vaccinated

Bait type	Number of dogs offered a vaccine bait	% of bait consumption (dog chewed vaccine bait)	% of vaccinated (sachet perforation)
Egg	1540 (84.6%)	79.9% (1231 / 1540)	93.4% (1115 / 1194)
Egg+	280 (15.4%)	72.5% (203 / 280)	96.9% (185 / 191)
Total	1820	78.8% (1434 / 1820)	93.9% (1300 / 1385)

Egg baits (79.9%) were more often chewed than Egg+ baits (72.5%) ($p = 0.006$).

There was no significant difference between bait types for the sachet perforation ($p = 0.089$).



Percentage of bait consumption and subsequently considered vaccinated

Ownership status	Number of dogs offered a vaccine bait	% of bait consumption (dog chewed vaccine bait)	% of vaccinated (sachet perforation)
Ownerless dogs	1379 (75.8%)	81.9% (1130 / 1379)	93.0% (1020 / 1097)
Owned dogs	338 (18.6%)	70.1% (237 / 338)	98.2% (222 / 226)
Unidentified dogs	103 (5.7%)	65.1% (67 / 103)	93.6% (58 / 62)
Total	1820	78.8% (1434 / 1820)	93.9% (1300 / 1434)

Ownerless dogs (81.9%) significantly consumed bait more than the other two dogs ($p < 0.0001$).

Owned dogs (98.2%) were significantly vaccinated more than the other two dogs ($p = 0.011$).



Serology study

Day 0

Day 28

Day 90

Serum collection

Serum collection

Serum collection

Oral rabies vaccination



Serology study

Day 0

Oral rabies vaccination
Serum collection

Day 28

Serum collection

Day 90

Serum collection

ELISA test (Bio-Rad Platelia® Rabies II ELISA)

at National Institute of Animal Health (NIAH), Department of Livestock Development, Thailand

A serum titer of ≥ 0.5 EU/ml was considered as protective level (positive)



Serology study

Day 0

Day 28

Day 90

NEGATIVE

>>>

POSITIVE

>>>

POSITIVE

Successful vaccination

25 dogs (75.76%) from 33 naïve dogs



Dog characteristics		Successful vaccination		p-value
		Yes (%)	No (%)	
Age	Adult	17 (77.3%)	5 (22.7%)	1.000
	Juvenile	7 (77.8%)	2 (22.2%)	
Gender	Female	16 (72.7%)	6 (27.3%)	0.687
	Male	9 (81.8%)	2 (18.2)	
Ownership status	Ownerless	18 (69.2%)	8 (30.8%)	0.154
	Owned	7 (100%)	0	
Social status of dog during vaccination	With other dogs	22 (78.6%)	6 (21.4%)	0.573
	Single	3 (60%)	2 (40%)	



Factors		Successful vaccination		p-value
		Yes (%)	No (%)	
Bait type	Egg	22 (73.3%)	8 (26.7%)	0.560
	Egg+	3 (100%)	0	
Chewing times	More than or equal 10 times	24 (77.4%)	7 (22.6%)	0.431
	Less than 10 times	1 (50%)	1 (50%)	
Number of bait consumed	One bait	25 (80.6%)	6 (19.4%)	0.053
	Two baits	0	2 (100%)	
Vaccinator	Study team	21 (72.4%)	8 (27.6%)	0.550
	Dog feeder & Local staff	4 (100%)	0	





Safety of ORV

- No vaccine-induced adverse effect in captive dogs for 1-year observation period
- No adverse effects in dogs or humans after ORV campaign





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Conclusion

- Oral rabies vaccine improved vaccine coverage in free-roaming dog population in Thailand.
- Well cooperation from the community is needed to increase accessibility of the free-roaming dogs.
- The application of ORV SPBN GASGAS vaccine strain for free-roaming dogs in Thailand offers a safe and efficacious.



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Acknowledgement

