IMPACT OF DOG VACCINATION COVERAGE ON RABIES OUTBREAK PROBABILITY AND COST

KVA ANNUAL SCIENTIFIC CONFERENCE

Date 27TH September 2021 MALINDI, KENYA

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PET PARASITICIDES
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#4 global market position


FOR DOGS 10.1–24.0 lbs
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Kills Fleas and Ticks
Soft Beef-Flavored Chewables
› Kills fleas before they can lay eggs
› Prevents flea infestations
› Lasts for the entire month
Net Contents: 3 Chewables
Each chewable contains
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Give once a month
FOR USE IN DOGS AND PUPPIES
8 WEEKS OF AGE AND OLDER
NADA 141-406
APPROVED BY FDA
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FRONTLINE VET LABS
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HOW MANY DOGS TO VACCINATE TO REACH 70% SEROCONVERSION (PROOF OF IMMUNIZATION)?

Conclusion, the less the vaccine is immunogenic, the more dogs must be caught to reach the objective. And choosing a poor (cheap?) vaccine increases the logistic costs

Rabisin : 97% seroconversion

Reference: B. Chomel, G. Chappuis, F. Bullon, E. Cardenas, T. David de Beublain, M. Lombard, and E. Giambruno, Mass Vaccination Campaign Against Rabies: Are Dogs Correctly Protected? The Peruvian Experience, Clin Infect Dis. (1988) 10 (Supplement 4): S697-S702.

FMD WEBINAR
BI FMD EXPERTISE WORLDWIDE

DATE: 13th OCTOBER 2021
TIME: 12:30PM EAC TIME
VENUE: ZOOM- Webinar ID:
952 1974 1497
Passcode: **072397**

Topics to be covered include:

- BIAH FMD expertise worldwide
- Vaccination success/ failure in control of FMD in target species
- Post vaccination monitoring and duration of immunity(DOI)
- FMD Vaccine and Antigen banking

Speaker:

Dr Nicolas DENORMANDIE Director, Scientific Service & Africa/Middle East/LATAM Support Veterinary Public Health Center Boehringer Ingelheim Animal Health

#1 CATTLE PARASITICIDES

RABISIN: A SIGNIFICANT FIELD EXPERIENCE IN CONTROLLING RABIES

And a few economic considerations

SOUTH AMERICAN EXPERIENCE WITH MERIAL.
THE WAY TO RABIES ELIMINATION

The historical Lima (Peru) campaign 1985.
A one month massive dog rabies vaccination campaign resulted in Rabies elimination in Lima during 3 years post campaign.

- Assessment of a campaign design
- Experience in mesuring the dog population through dog's identification and post campaign counting operations
- Follow-up of «non medicalized» dogs seroconversion rate and duration of post vaccinal immunity (compared to laboratory dogs)

Rabies management in Mexico City

- Yearly vaccination campaigns resulted in rabies control in extremely dynamic urban environment (megalopolis)
- This experience demonstrates the need of long lasting strategy (repeated yearly campaigns) when one-shot campaigns deliver transient results.

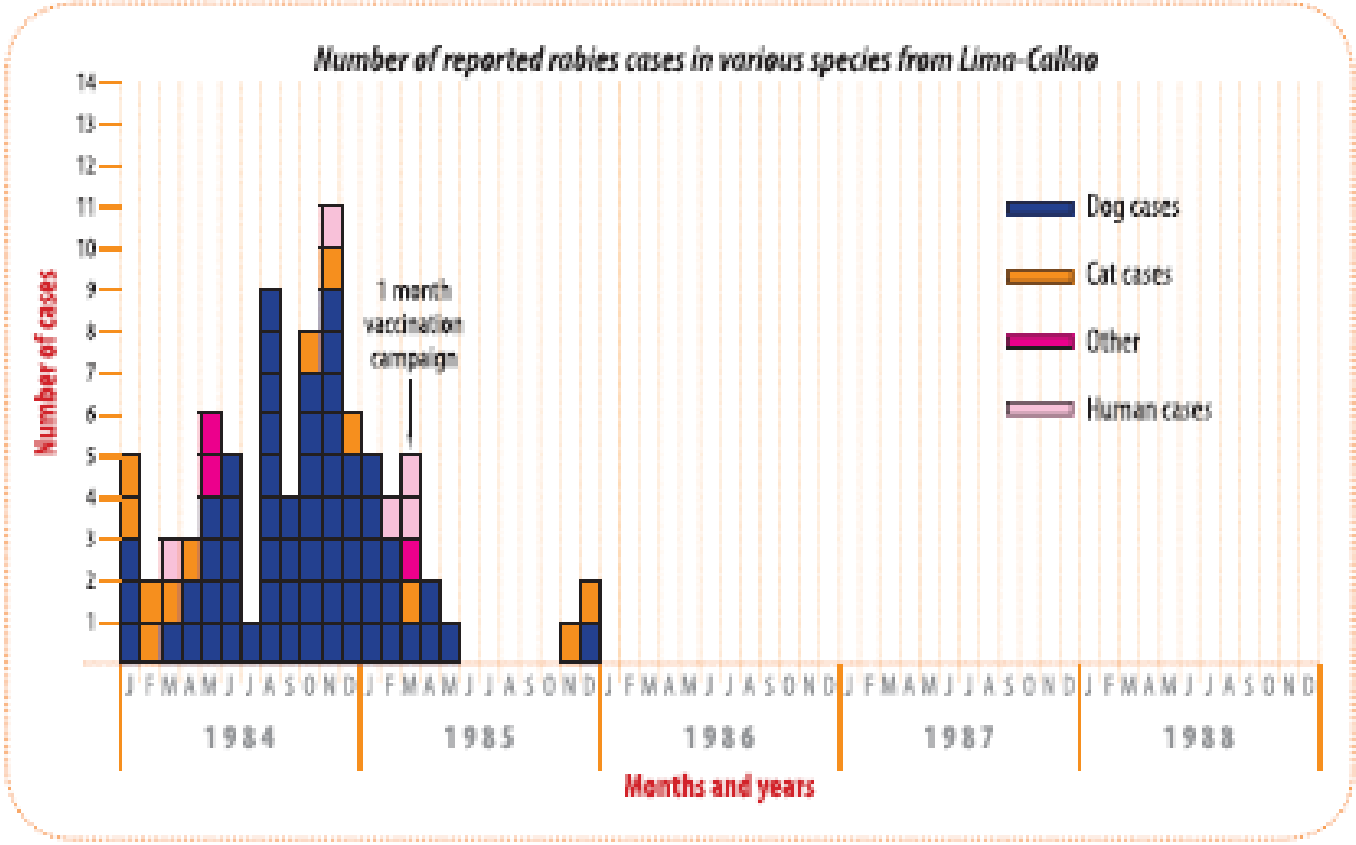
A significant field experience to be considered
- Peru 1985 -

- **RABISIN®** was used for a dog mass vaccination campaign in Lima in 1985.

- 273 000 dogs and 54 000 cats were vaccinated during a 1 month vaccination campaign.
  After this campaign it was measured that 78% of Lima's dog population was vaccinated against Rabies.

- Results:
  - **No Rabies cases reported on vaccinated animals**
  - **Only 3 animal rabies cases were reported during the 3 years post campaign.**
  - **No human rabies cases reported during 60 months post campaign.**
  - **Dogs seroconversion rate with Rabisin was over 97%**
  - **Duration of immunity on dogs was assessed to be at least 3 years (based on serological results) on at least 83% of vaccinated dogs**

A SIGNIFICANT FIELD EXPERIENCE TO BE CONSIDERED
- PERU 1985 -



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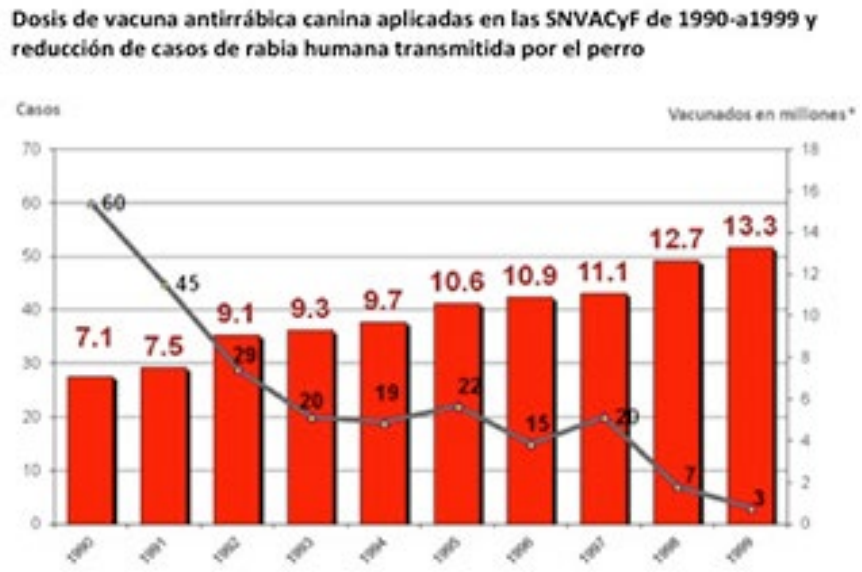
MEXICO CITY 1990-2013

http://www.cenaprece.salud.gob.mx/programas/interior/zoonosis/ceremonia25aniversario_SNVACyF.html



Human rabies elimination (from 60 to 0 cases yearly)
following yearly dog rabies vaccination campaigns
(7 to 18 milions dogs vaccinated annually)

KEY POINTS TO BE CONSIDERED FOR A SUCCESSFUL RABIES FIGHT – OBJECTIVES-

In Africa, dogs are the vector for Rabies (directly responsible for more than 90% of human contaminations)

- The preventive approach should target dogs

Rabies virus doesn't circulate anymore among the dog population when 70% of dogs are immunized (WHO).
This ratio should be kept along the year
THIS IS THE OBJECTIVE TO REACH FOR SUCCESS

20% of the dog population is renewed yearly, the average age is less than 3 years for a dog in Africa.

- Vaccination should be performed anually to keep the protection level on such a population
- In case of yearly campaigns, the vaccination objective should be 80 to 90% to keep the 70% level along the year.
- Juvenile dogs shound be systematically vaccinated whatever their age

KEY POINTS TO BE CONSIDERED FOR A SUCCESSFUL RABIES FIGHT - HOW TO DO IT?-

The vaccination objective should be clearly defined:

« How many dogs should be vaccinated and where? »

This is done following a primary evaluation of the dog population (Ni).

- It will drive the design of the 1st vaccination campaign

+ Budget planification

+ Design of the vaccination/identification campaign

+ Timeframe necessary to run the campaign

+ Counting operations to mesure the percentage of dogs vaccinated and validate the size of the dog population initially estimated

Vaccinated dogs must be identified

- during the vaccination campaign (plastic collar, paint on the fur…)
- Number of vaccinated dogs must be recorded: A

Counting operation must be run 1 week after the campaign,

- On the streets and in homes (Randomization)
- Record the number of dogs with identification (rabies collar)
- Record the number of dogs without identification

=> Percentage of vaccinated dogs (%V) – Objective reached?

PRACTICAL APPROACH

Hypothesis: in a city, the municipal services estimate the dog population at 20 000 dogs.

A vaccination campaign is planned to vaccinate 16 000 dogs (to reach 80% vaccination rate on the theoretical 20 000 dogs population.

16 000 dogs are vaccinated and marked during a 1 month lasting vaccination campaign involving 15 people working in 5 vaccination spots across the city.

1 week after the campaign, counting operations are run on the streets and in households: it appears that 50% of dogs are marked.
=> *This means that, taking in consideration that 16000 dogs were vaccinated, the canine population was not 20 000 as supposed but 32 000.*

The vaccination campaign did'nt manage to reach the 80% objective
but it provides the objective for the next campaign: 80% from
32 000 = ***25 600 dogs***

FEW ECONOMIC CONSIDERATIONS AROUND RABIES VACCINATION

RABIES VACCINATION CAMPAIGNS: FREE OR OWNER CHARGED WHAT IS THE TOTAL COST PER DOG VACCINATED?

Table 4. *Campaign cost comparisons: owner-charged vs. free vaccination*

	Owner charged (new study)*		Free vaccination (previous study)*	
	Prices in FCFA†	% of total societal cost	Prices in FCFA†	% of total societal cost
Public sector				
Vaccine, syringe, certificate, collar, receipt	223 460	0·06	1 731 218	0·31
Human pre-prophylaxis vaccination‡	291 700	0·08	291 700	0·05
Equipment of vaccination point	564 291	0·15	368 300	0·07
Salaries§	1 687 200	0·46	897 500	0·16
Transport	404 000	0·11	400 000	0·07
Information	326 000	0·09	330 000	0·06
Income from animal owners	−786 000	−0·21	0	0·00
Total public sector	**2 710 651**	**0·73**	**4 018 718**	**0·73**
Private sector				
Working loss and transport	196 500	0·05	1 500 000	0·27
Vaccination cost	786 000	0·21	0	0·00
Total private sector	**982 500**	**0·27**	**1 500 000**	**0·27**
Societal cost¶				
Total	**3 693 151**		**5 518 718**	
Number of animals vaccinated	*393*		*3000*	
Average cost per animal vaccinated				
Public sector	6897		1340	
Private sector	2500		500	
Societal cost	9397		1840	
Total cost (US$)				
Public sector	5595		8295	
Private sector	2028		3096	
Societal cost	7623		11 391	
Cost per animal vaccinated				
Public sector	14·24		2·76	
Private sector	5·16		1·03	
Societal cost per vaccinated animal (US$)	***19·40***		***3·80***	

Source:
Durr & coll, Effectiveness of dog rabies vaccination programmes: comparison of owner-charged and free vaccination campaigns, Epidemiol. Infect. 2009

There are from 5 to 20 times less dogs than humans and prevention should target dogs first to break the virus circulation

Dog vaccination campaigns:
The cost of the vaccine itself is low and often neglectable compared to the logistic costs (dogs catching and handling)

Vaccine + syringe/needle + identification collar + vaccination booklet represent from 6 to 30% of the vaccination campaign costs

CONSÉQUENCE:

Vaccination should be free of charge or sponsored (reward to the person/children who bring the dog to vaccination) to minimize the logistic costs and decrease significantly the cost per vaccinated dog

Total social cost per dog is:

- 20$ in case of owner charged vaccination campaign
  (when 0,2$ charged to pet owner)
- 4$ in case of free vaccination campaign
- Probably even less in case the person who bring the dog to the vaccination point is rewarded.
  (Exemple: sweets to children who bring the dog)

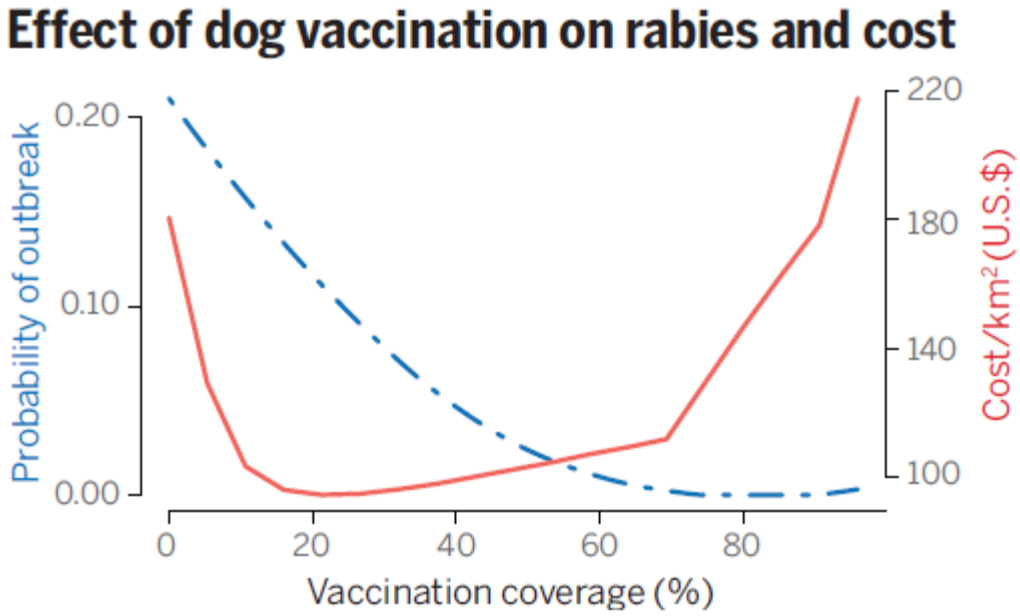
In case of well organized vaccination campaign (media/communication/awareness) a public free of charge vaccination campaign doesn’t decrease private vets business

There is no competition between private vets and public sector but a real SYNERGY!

Public & Private sectors should work together.

Need for coordination.

DOGS RABIES VACCINATION CAMPAIGNS: GLOBAL COST



Impact of dog vaccination coverage on rabies outbreak probability and cost. The left axis and the dashed blue line show the probability of an outbreak of 10 or more cases being seeded by an introduced case under different levels of vaccination coverage. The right axis and solid red line indicate the total costs (U.S.$) per km^2 of rabies control with increasing vaccination coverage. Vaccination coverage of 70% of the canine population reduces outbreak probability close to zero and is cost-effective. Cost data from (*9*), probability data from (*10*).

Source:
Felix Lankester & coll,
Implementing Pasteur's vision for eliminating rabies.
Science, 26 sept 2014
Vol. 345, issue 6204
pp. 1562-1564

KEY POINT:

The last % of dogs to be reached are the more expensive to vaccinate (catching a dog can sometimes be a struggle and for some of them it costs!)

Vaccinate 70% to 80% of the dog population is an objective rather easy to reach and cost effective.

In Africa 90% of dogs are fed by humans. They can be catched, they can be vaccinated. The % of wild dogs impossible to catch is extremely low.

CONSEQUENCE

The way to make a dog vaccination campaign being cost effective is decreasing the logistic costs (such approch would decrease the cost per vaccinated dog by several dollars).
What makes a vaccination campaign cheap and effective is when people bring the dog at the vaccination spot.

To succeed in this, raising awareness is key

- Targeting schools and teachers
- Targeting local religious leaders

It requires also communication tools

- Radio spots
- Billboards, Posters and flyers
- Vehicules with loudspeakers

Trying to get few cents discount on vaccine doses would unsignificantly decrease the total cost of a vaccination campaign

HOW MANY DOGS TO VACCINATE TO REACH 70% SEROCONVERSION (PROOF OF IMMUNIZATION)?

Hypothesis:

- Vaccine A induces 97% seroconversion
- Vaccine B induces 87% seroconversion
- Vaccine C induces 70% seroconversion

How many dogs should be vaccinated with vaccines A, B or C?

- Vaccine A: 70% / 97% = 72,5% Should be vaccinated
- Vaccine B: 70% / 87% = 80,5% Should be vaccinated
- Vaccine B: 70% / 70% = 100% Should be vaccinated

Conclusion, the less the vaccine is immunogenic, the more dogs must be caught to reach the objective. And choosing a poor (cheap?) vaccine increases the logistic costs

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THANK YOU!

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