RABIES ERADICATION IN BELGIUM
BY FOX VACCINATION USING
VACCINIA-RABIES RECOMBINANT VIRUS

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1 INTRODUCTION.

In Belgium, as well as in other countries of Western Europe, the red fox is the vector and reservoir of the current endemic of sylvatic rabies. Since rabies control by fox population reduction was not achieved, oral immunization of foxes, by the distribution of baits containing a suspension of vaccinia-rabies recombinant virus, has been experimentally assessed and subsequently engaged in the whole infected area of Belgium.

2 METHOD.

2.1 Vaccine.

A recombinant vaccinia virus expressing the immunogenic glycoprotein of rabies virus (V-RG) has been developed by Transgene in France. This vaccine is currently being used at a large scale level in France, the Grand Duchy of Luxembourg and Belgium. Field trials are also in progress in the USA for the oral vaccination of raccoons. The development of V-RG has been performed by five groups of collaborators: Rhone Merieux, CNEVA and Transgène in France, the Wistar Institute in the USA and the University of Liège in Belgium. Numerous experiments carried out in laboratory as well as in the field have demonstrated the efficacy, safety and stability of this vaccine.

ABSENCE OF PATHOGENICITY

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2.2 Baiting system.

A suspension of V-RG at 108 TCID50 is contained in a plastic sachet. This is then enclosed in a fox-attractive mixture consisting of plant and animal proteins and fish oil aggregated by a synthetic polymer. Tetracycline, which has been introduced into each bait, serves as a long term bio-marker of bait uptake and can be detected in bones by using fluorescence microscopy. The efficacy of this vaccine-bait system has been tested in captive foxes. Each fox of three experimental groups was fed one, two or three baits containing 108 TCID50 of V-RG. As shown by the incorporation of tetracycline, all the foxes voluntarily ingested at least one bait. One month after baiting, Fifteen of eighteen foxes developed rabies antibodies, 14 of 18 developed vaccinia antibodies and 16 of 18 foxes resisted a lethal rabies challenge.

The VR-G vaccine – bait system:

- Is efficient (Immunogenicity + attractive power)
- Is safe for target and non-target species
- Is stable (storage without freezing, durable activity in the field)
- can be dropped by air (mechanical resistance)
- is easily available

2.3 Campaigns of fox vaccination.

The rabies infected area covered 10 000km² in the southern part of the country and was bordered by a river and four neighbouring countries: the Netherlands, Germany, Grand Duchy of Luxembourg and France (see map 1). This region was heavily infected before the campaigns of fox vaccination - 840 animal rabies cases were recorded in 1989. That represents a mean rate of 1 case per 10km².

In the autumn of 1989, the first campaign of fox vaccination was carried out in the whole of the infected area. From 1989 until 1991, four similar full campaigns were performed. Each time, 150000 V-RG baits were dropped by plane at a mean density of 15/km². In 1992, a new vaccination area was defined to create an immune belt along political borders. Two defense campaigns were carried out in spring and autumn-winter 1992.
A. Rabies incidence

N CASES

SEMESTRAL EVOLUTION OF ANIMAL RABIES IN BELGIUM
Black arrows: full campaigns; white arrows: partial campaigns (along borders).

B. Spatial evolution of rabies

YEAR 1992
CONTAMINATED AREA: < 2000 KM² (BORDER)
34 RABIES CASES
YEAR 1992

430 RABIES NEGATIVE FOXES

1st QUARTER 1993

1 RABIES CASE
1 badger
65/79 foxes TC+ (82%)
C. Consequences

**Evolution of Post-Exposure Human Treatments**

**Evolution of Rabies in Domestic Carnivores**

Black arrows: full campaigns; white arrows: partial campaigns (along borders).
3 Conclusions.

Thanks to the vaccination of foxes, rabies disappeared from 80% of the initially infected area of Belgium.

The efficiency and stability of the vaccine-bait association made these results possible within two years.

The creation of an immune belt along borders is still required.

Vaccination will be completely interrupted when the defined surveillance area will be rabies-free for at least 1 year.

Cartes et annexes pages 116-117-118-119

References.

Brochier, B. et al., Vaccine 8, 101-104 (1990).