4. MISCELLANEOUS ARTICLES

4.1 An Adapted Concept for the Elimination of Sylvatic Rabies in Switzerland

by Urs Breitenmoser and Reto Zanoni,
Swiss Rabies Centre, Institute of Veterinary-Virology,
University of Berne, Länggass-Str. 122, CH-3012 Berne, Switzerland

Abstract

The objective of the rabies control programme is the elimination of sylvatic rabies in Switzerland by means of oral immunistion of red foxes. This requires a sensitive strategy referring to (1) the technique of oral vaccination (2) a geographical concept for the application of oral vaccination, and (3) a surveillance system for the progress of the epizootic as well as for the efficacy of the immunisation of foxes. The concept for the elimination of sylvatic rabies in Switzerland was based on surveillance zones and geographical compartments for vaccination campaigns. After difficulties in rabies control from 1990-94, as a consequence of an extraordinary growth of the fox population, this strategy was extended with tools to deal with high fox abundance and re-infections. In this paper, we give a brief outline of the concept for the rabies control programme in Switzerland for the years 1996-2000. The concept was prepared by the Swiss Rabies Centre at the University of Bern, together with the Swiss Federal Veterinary Office, and approved by the veterinary services of the cantons.

Since the first successful trials to immunise red foxes (*Vulpes vulpes*) against rabies in the field by means of vaccine baits in 1978 (Wanderler, et al. 1988a), oral vaccination campaigns have been widely accepted as the only efficient instrument to control sylvatic rabies. However, along with an efficient method, one needs a strategy defining how to apply oral immunisation successfully. Such a strategy for Switzerland has been outlined by Kappeler et al. (1988), Wandeler et al. (1988b), and Kappeler (1991). The base of the control strategy is a zonal concept for the surveillance of rabies and the oral vaccination campaigns (BVET 1990, Kappeler 1991). We distinguish four zones (Fig. 4.1.1):

A) rabies area (30 km encircling each positive case of sylvatic rabies);

B) vaccination area (the area treated by means of oral vaccination during the past six months; identical to zone A, where compartment limits (Fig. 4.1.1) do not impose a different determination);

C) surveillance area (the rest of Switzerland):

D) observation area (a zone of 50 km outside the Swiss national border).

Each animal suspicious of rabies, domestic and wild, from zones A, B, and C, has to be transferred to the Swiss Rabies Centre for diagnosis. From zones A and B, a sample of 10 <u>not</u> suspicious foxes per 100 km^2 have to be additionally analysed for rabies and tetracycline each year. From zone D, each rabies case reported from laboratories of neighbouring countries is taken into consideration to define prophylactic measures.

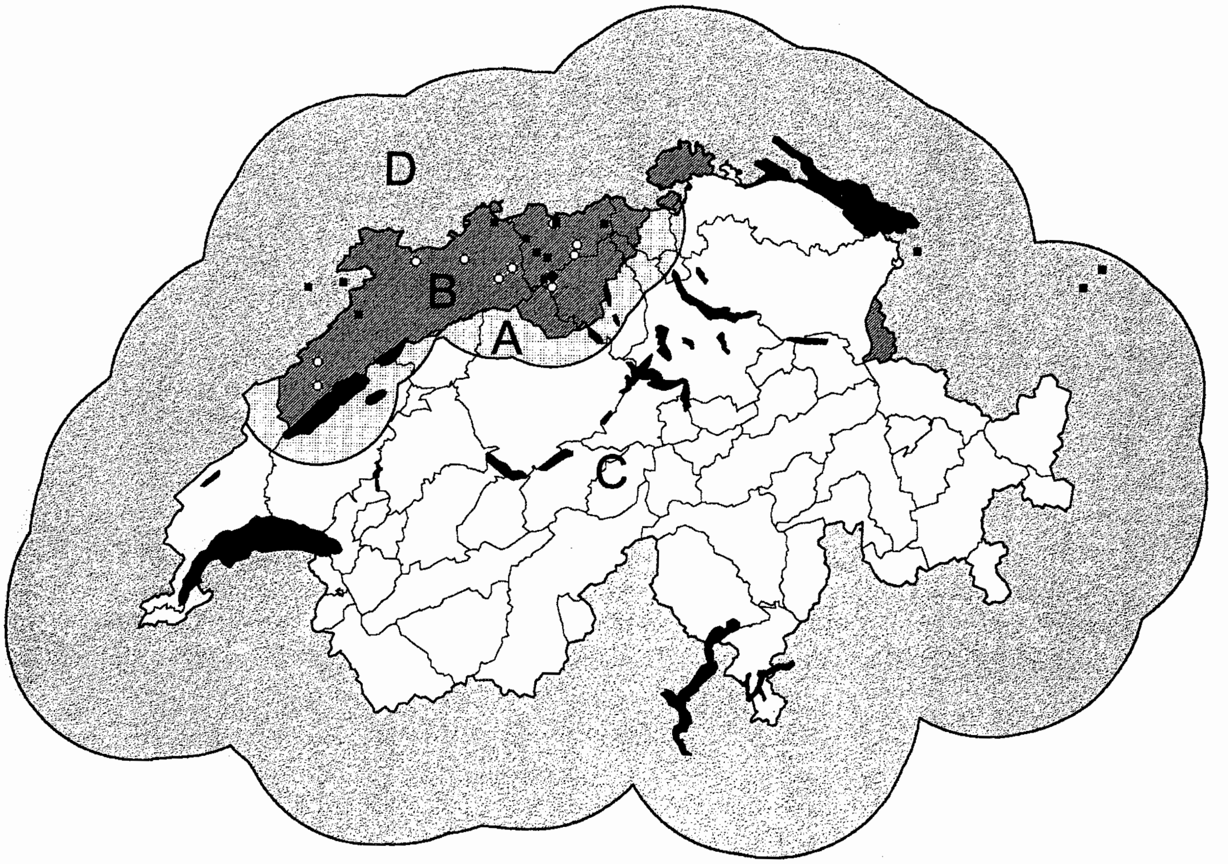
To apply rabies control measures, Switzerland was divided into 23 epidemiological compartments and 11 sub-compartments (Fig. 1), delimited through natural or artificial barriers to fox movements wherever possible (Kappeler et al. 1988, Kappeler 1991, Wandeler et al. 1988b). An infected compartment will be trated by means of oral vaccination until it is free of rabies; subsequently, the sectors where rabid foxes could enter will be protected. This strategy allowed to free all compartments but one from rabies until 1978. Only the large compartment of the Jura Mountains in north-western Switzerland remained infected. This region is a perfect fox habitat, and there are no natural or artificial barriers to restrict the movement of foxes. The cases declined to a total of 25 in the year 1990, but in the same year, the area was re-infected from the French Jura Mts. The number of rabies cases diagnosed increased in the Swiss Jura Mts. from year to year to a total of 225 in 1994, in spite of continuous vaccination campaigns. In the same period, the number of cases declined steadily in the French part of the Jura Mts. due to oral vaccination of red foxes. The reason for the problems in Switzerland was the 4- to 5-fold increase of the fox population within the past ten years and an increasing importance of young foxes for the prersistence of rabies (Breitenmoser et al. 1995). Measures to respond to this problems were tested and incorporated into the control strategy (Breitenmoser and Kaphegyi 1995). Consequently, we added the following elements coping with the increased fox density to the rabies control strategy.

1. adjustment of the vaccine bait distribution to the fox abundance and increase of the number of baits per km^2 along with the increasing density of foxes;
2. an additional vaccine bait distribution at the fox dens in early summer (May to June) to enhance the immunisation of young foxes before their dispersal;
3. double vaccination campaigns within four weeks for any emergency expansion of the area vaccinated;
4. use of the more thermo-resistant V-RG (vaccinia-rabies glycoprotein recombinant virus) vaccination system if the incidence of rabies does not decrease with the attenuated rabies virus vaccine system;
5. expansion of areas vaccinated prophylactically in space and time;
6. continuation of vaccination campaigns for at least two years after the discovery of the last rabies case within a compartment.

Oral immunisation of foxes against rabies has perfectly worked if applied in situations where the fox abundance was lowered by the disease. In many parts of Western Europe, the high reproductive output of the predominantly immunised adult foxes led to an increasing fox density. Consequently, the common problem recently observed in western European countries, where oral vaccination campaigns had been carried out for many years, was the persistence of rabies in areas of residual foci or afer a re-infection. The particularity of such situations - typically in a final state of a rabies epizootic - calls for a sensible analysis and for a flexible use of the available control tools. To allow such a flexible response, however, we need, additionally to a continuous surveillance of the epizootic, an efficient monitoring of the fox population, too. The control measures described above must therefore be supported by the following procedures: (1) steered monitoring of the fox population in collaboration with local management units; (2) linking of variables of the control programme (e.g. baits per km^2) with parameters of the fox population (e.g. fox density); (3) close collaboration with neighbouring countries, leading to collaborative vaccination campaigns in border areas; (4) precise sampling of foxes to determine the efficacy of the immunisation campaigns and to answer specific questions. With these adaptations, rabies control programmes should also work in high density fox populations. There are enough encouraging signals that with an adaptation of the vaccination strategies, oral immunisation will still be the ultimate instrument to eliminate rabies.

Acknowledgement. We thank U. Müller for producing the graphic.

FIGURE 4.1.1.



Caption to figure:
The geographical concept of rabies control in Switzerland and the Principality of Liechtenstein demonstrated with the situation in 1995. Thick lines limit the four surveillance zones: A = rabies area (dotted); B = vaccination area (hatched); C = surveillance area (blank); D = observation area (grey). Thin lines indicate epidemiological compartments within Switzerland, limited by natural (high mountain ridges, lakes, large rivers) or artificial (fenced highways) barriers. Black squares (foxes in Switzerland, all species in the observation area), and blank circles (species other than fox in Switzerland) represent rabies cases diagnosed in 1995.

References:

Breitenmoser, U., Kaphegyi, T., Kappeler, A. & Zanoni, R. (1995): Significance of young foxes for the persistence of rabies in northwestern Switzerland. In: M. Schwyzer, M. Ackermann, G. Bertoni et al.: Immunobiology of viral infections. Proc. 3rd congress Europ. soc. vet. virol. Zurich: 391-396.

Breitenmoser, U. & T. Kaphegyi (1995). Rabies persistence and fox population dynamics in Switzerland. WHO meeting on cooperation on oral immunization of foxes against rabies in 1995 (Central and Eastern Europe). World Health Organization, Geneva: 17-18.

BVET - Bundesamt für Veterinärwesen (1990). Strategie zur Bekämpfung der Tollwut. Mitteilungen des Bundesamtes für Veterinärwesen, 15: 123-125.

Kappeler, A. (1991). Die orale Immunisierung von Füchsen gegen Tollwut in der Schweiz. Diss. Univ. Berne: 146 pp.

Kappeler, A., Wandeler, A.I. & Capt, S. (1988). Ten years of rabies control by oral vaccination of foxes in Switzerland. In: P.P. Pastoret, B. Brochier, I. Thomas, & J. Blancou (Eds.), Vaccination to control rabies in foxes. Luxembourg, Commission of the European Communities: 55-60.

Wandeler, A.I., Capt, S., Kappeler, A. & Hauser, R. (1988a). Oral Immunization of wildlife against rabies: concept and first field experiments. Rev. infect. Diseases, 10: 649-653.

Wandeler, A.I., Capt, S., Gerber, H., Kappeler, A. & Kipfer, R. (1988b). Rabies epidemiology, natural barriers and fox vaccination. Parassitologia, 30: 53-57.

4.2 Rabies in a Puppy - South Dakota, 1995

On July 28, 1995, the South Dakota Public Health Laboratory diagnosed rabies in an 8-week-old puppy; on July 23, the puppy had had onset of neurologic signs (e.g., head tilt, ataxia, and somnolence) that culminated in seizures, and the puppy was euthanized on July 31 and tested positive for rabies. This report summarizes the epidemiologic investigation and follow-up management by the South Dakota Department of Health (SDDH), with assistance from the Centers for Disease Control (CDC), of persons and domestic animals potentially exposed to rabies.

On July 8, the neighboring families acquired the two puppies from a private owner near Summit, South Dakota. The puppies were from a litter of nine born on May 29. On June 13 or 14, a skunk attacked the litter in a garage where they were kept. The skunk was killed by the owner of the puppies but was not tested for rabies. All the puppies were free of clinical signs consistent with rabies when given away between July 8 and July 27. However, the original owner of the puppies was uncertain of the identity of all the persons who had adopted them. Through announcements in the local news media and distribution of flyers door-to-door by the Aberdeen Area Indian Health Service in Sisseton, by August 4 the remaining seven puppies were identified to be in private residences located throughout eastern South Dakota. Six of the puppies tested negative for rabies at the South Dakota Public Health Laboratory; the seventh puppy had been killed by the owner because it was part of the exposed litter, and it was unavailable for testing. The dam of the litter and another contact dog - neither of which were currently vaccinated against rabies- were euthanized and tested negative for rabies. Two other potentially exposed pet dogs, past due for rabies vaccination, were identified; they were managed by home quarantine and booster vaccination according to the 1995 animal rabies compendium and remained symptom-free.

The SDDH initiated efforts to identify persons with potential exposure to the two puppies and determine their risk for rabies infection. In response to the alert, the state health department and four major health-care facilities screened by phone or personal interview approximately 150 persons possibly exposed during July 13-31 (the established period of potential rabies transmission). In addition, SDDH conducted town meetings and provided briefings to health-care providers, the news media, and animal-control authorities. Of the 150 persons, 22 (15%) (including nine persons from the veterinary clinic in which the ill puppy had been treated and euthanized and seven persons who had had contact with the puppy that had been destro-