Onderstepoort Journal of Veterinary Research, 60:477–478 (1993)

Oral rabies vaccination of jackals: progress in Zimbabwe

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Work on the development of an oral vaccination system for jackals is underway at the Veterinary Laboratory (Diagnostics and Research Branch), Zimbabwe. It is anticipated that the system will be used to control the large rabies epidemics that occur in jackals in Zimbabwe. This paper summarizes the progress made to date.

The study aims to:

- identify an effective oral vaccine for use in jackals, which is also safe when ingested by potential non-target species;
- develop an effective baiting system which delivers the vaccine to an adequate proportion of jackals; and
- devise a field vaccination campaign strategy to effectively control jackal rabies epidemics.

To date most research has been concentrated on the first two of these aims.

Using SAD (Street Alabama Dufferin) vaccine virus provided by the Swiss Rabies Centre in Berne (SAD-Berne), 8 black-backed and 7 side-striped jackals were vaccinated by oral instillation with doses ranging from $10^{6,3}$–$10^{7,5}$ median tissue culture infectious doses ($TCID_{50}$). Significant serum neutralizing anti body titres were achieved in all the jackals, including those vaccinated with the lowest dose of $10^{6,3}$ $TCID_{50}$. Challenge was carried out with a jackal-derived salivary gland isolate on eight of the jackals at one month and seven at 12 months after vaccination. The jackals were observed for six months after challenge. All vaccinated jackals resisted challenge, while all three controls succumbed to rabies.

Safety trials using SADBerne vaccine virus were carried out in Chacma baboons (*Papio ursinus)*, a prominent non-target bait-consuming species (Bingham, Foggin, Gerber, Hill, Kappeler, King, Perry & Wandeler 1992). Two of four baboons which received $10^{7,5}$ $TCID_{50}$ of vaccine virus instilled into the oral cavity died of vaccine-induced rabies. Diagnosis of rabies was made by the demonstration of antigen in the brain using the fluorescent antibody and mouse inoculation tests. The isolated virus was found to be indistinguishable from SAD by monoclonal antibody typing using antinucleocapsid monoclonal antibodies from the Swiss Rabies Centre. These baboons did not excrete the virus in the salivary glands. The two surviving baboons had serum neutralizing antibody titres of 1:25 at one month, which declined to 1:5 at two months.

Because of the unacceptable pathogenicity of SAD-Berne virus in baboons, it was decided to reject this vaccine as a potential candidate for jackal immunization. Trials were then started on the SAG-2 (SAD-Avirulent-Gif 2) vaccine, an avirulent mutant of SADBerne. This vaccine virus was developed at the Laboratoire de Genetique des Virus, France under the direction of A. Flamand, and was produced by Virbac Laboratories, France. Two non-target

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species, Chacma baboons and African civets (*Civettictis civetta*), have been evaluated to date with respect to their susceptibility to SAG-2.

Five adult or sub-adult baboons, which were all in good health, were each given $10^{9,0}$ $TCID_{50}$ of SAG-2 vaccine virus instilled orally during light anaesthesia. They were observed for three months for signs of illness, after which time they were sacrificed. Brain, salivary glands and tonsils were removed and tested for the presence of virus by inoculation of tissue suspensions into suckling mice. Brain material was also tested for rabies virus antigen by the fluorescent antibody test. All the baboons remained healthy throughout the trial and no virus was isolated from the tissues taken. Salivary swabs taken on days 1, 3 and 7 after vaccine instillation, to test for local replication of virus in the tissues of the oral cavity, all tested negative on inoculation into suckling mice. Serum neutralizing antibody titres at one month ranged from 1:5–1:25.

Six civets were tested in a similar manner, except that they were not sacrificed at the end of the trial period. The same dose, $10^{9,0}$ $TCID_{50}$, was used. All remained healthy throughout the three-month observation period. Salivary swabs were taken at the end of the three months to test for virus excretion. No virus was isolated. Salivary swabs taken on days 1, 3 and 7 after vaccination, to test for local virus replication in the oral mucosa, were negative for rabies. At one month serum neutralizing antibody titres varied from 1:5–1:125.

Further trials using SAG-2 will be started in the near future. These include efficacy trials in side-striped and black-backed jackals and safety trials in other non-target species.

Baiting trials with captive jackals of both species and with black backed jackals under field conditions have shown that jackals are fastidious in their bait preferences. They did not readily consume baits composed of materials unfamiliar to them. Meat-based baits are very attractive, but these are usually consumed very rapidly. It is therefore important that baits are sufficiently rigid to necessitate chewing. Chicken heads have proved to be ideal as they are both "chewy" and attractive. In a series of field studies of bait uptake carried out in the south-eastern lowveld of Zimbabwe, up to 70 % of chicken heads were taken by jackals during the first night of deployment. The major non-target species identified during these trials were civets, warthogs (*Phacochoerus aethiopicus*) and honey badgers (*Mellivora capensis*). Baboons were found to be the major non-target species in the commercial farming areas in the more northern highveld areas of Zimbabwe.

REFERENCE

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