

Oral Bait Acceptance Research In D.C.'s Rock Creek Park

By John Hadidian

A wildlife rabies outbreak, thought to have originated in the western counties of Virginia and West Virginia in 1977, reached the metropolitan Washington, D.C. area in the fall of 1982. Although primarily affecting raccoons, this epizootic spilled over into other wildlife species that commonly inhabit the urban National Parks of the nation's capital, such as fox, bats, opossum, and woodchucks.

As cases began to be reported it was known that the outbreak would pose a genuine threat to humans, and that both immediate and long-term concerns for public health and safety in affected areas would have to be addressed. Such concerns, as well as others related to resource protection, were raised early in the National Capital Region (NCR).

With a concentration of urban parks in NCR the interaction between wildlife and humans is often intensive, and the potential always exists for wildlife and human health problems to be shared. Because of this, Regional Director Jack Fish determined that planning should begin to facilitate basic information collection concerning raccoon ecology, population dynamics, and rabies epizootiology. Rock Creek Park (ROCR) was selected as the study area, and David Manski, now a Resource Management Specialist at Aniakchak National Monument and Preserve, began a cooperative research project involving the University of the District of Columbia, the National Zoo, D.C.'s Department of Public Health, and the Centers for Disease Control in Atlanta.

In addition to collecting baseline data, the study was intended to identify concerns NCR would face in coming years with the expected continued presence of the disease. Much of the data collected are still being interpreted, but preliminary findings have been used to form the basis of a program of applied, management-oriented research intended to address specific questions about the interaction between raccoons, people, and rabies. This research has been coordinated with projects underway in adjoining states to provide a broader perspective to park managers

on issues they likely will face concerning the raccoon population.

Disease Marches North

Perhaps the most important issue with regard to the Mid-Atlantic Raccoon Rabies Outbreak (as it is now known) is whether the disease can be stopped or slowed before further spread into unaffected areas. Since 1983, movement northward has been inexorable, and rabies is now north of the Susquehanna River and into Pennsylvania. Public health officials in New Jersey and New York see it as only a matter of time before their states are affected, and there are no apparent barriers to prevent further spread of the disease. Where the rabies epizootic has already occurred it appears to be persisting in an endemic status, which further encourages questions about eradication.

Only two methods are presently known by which rabies-free areas can be created. One is immunization through vaccination, as we do cats and dogs. The other is population reduction through trapping and killing animals or otherwise reducing population densities below the level at which rabies can be sustained. Numerous impracticalities of population reduction in rabies control have been documented, such that this method is not advised except as a last resort in cases where control is absolutely mandated.

Impracticalities also exist concerning immunization, however, and these have long constituted roadblocks to rabies control in wild populations. To be effective, most wildlife rabies vaccines must currently be administered by injection. The difficulties of catching and immunizing a large enough segment of a wild population to protect against spread of the disease are considerable. Only in areas that have special geographical features, such as the narrow isthmus on the Delmarva Peninsula between Maryland and Delaware, can such procedures be attempted.

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Oral bait package in the field — blends with urban garbage.

Promising Programs

More promising are programs such as those now being conducted in both Europe and Canada to immunize red fox against rabies by using ingestible, or oral, baits. In these, orally active vaccines are loaded into a suitable medium or bait package, coated with an attractant, and dropped in large numbers over an area, usually from the air. The attractant draws the "target" animal's attention to the bait, which, when eaten, has the effect of immunizing against the disease. The major drawback to this procedure has been the development of effective oral vaccines. Recent advances in medical technology, however, are beginning to surmount that obstacle, and, in the near future, promise to make vaccine production speedy, less costly, and highly specific as products are tailored to individual species.

Once a vaccine is available, there still remains the complex task of delivering it. Details of bait density and placement, time of year, activity of target species, choice of attractants, and many other factors must be worked out. It was to test these and other factors related to bait acceptance in urban raccoons that a cooperative study was conducted in the summer of 1986 in Rock Creek Park with the Centers for Disease Control in Atlanta, the Southeastern Wildlife Disease Cooperative Study, the Ministry of Natural Resources in Ontario, Canada, the Virginia State Department of Health, and the USDA Animal and Plant Health Inspection Service (APHIS) unit in Denver, Colorado.

Bait Packages

Using methods tested already in European and Canadian studies, and also being used in two undeveloped areas in Virginia, a thousand bait packages were prepared for distribution in a 200 acre (80 hectare) study area in Rock Creek Park. Each bait package consisted of three things: (1) a plastic bag, perforated with small holes and stamped with a message identifying the contents and the purpose of the study, (2) the bait itself, a wax-coated sponge cube with a placebo vaccine mixture injected into the sponge matrix, and (3) the attractant, a slurry made of commercially available canned mackerel that had been used with success livetrapping raccoons in the past.

Each bait also contained a small amount of iophenoxic acid (IA), a substance which has been found to be an excellent biological marker, causing an elevated blood iodine level to appear in animals that ingest it. This seromarker was chosen instead of the more usual biomarker, tetracycline, because the use of tetracycline necessitates the removal of at least one tooth from each subject, while a simple blood sample will suffice to identify the presence of IA.

The baits were dropped along preestablished lines by volunteers, and left out for a period of three weeks. Following the bait-out period, livetrapping began at 15 locations and was continued for two weeks. Trapped raccoons were examined and bled, and serum samples were assayed in Denver for blood iodine levels. By determining how many of the trapped raccoons had taken baits it would be possible to estimate whether sufficient protection would have been given to the population had a vaccine been used, rather than the seromarker.

Results Encouraging

The results obtained were encouraging. Fifty-three raccoons were trapped from the study area in a ten-day period, and blood was obtained from 52. Of these, 33 (63%) had elevated blood iodine levels indicating

that they had eaten baits. Another 6 (12%) had slightly elevated iodine levels and were classified as borderline status, while 13 (25%) had no blood iodine rise above that typical of the control population. Too few nontarget animals were sampled to allow concrete inferences to be drawn, but there was evidence from both field signs and trapping that baits also were eaten by fox, feral cats, opossums, shrews and probably crows. Although each of the thousand bait packages had been stamped with a message identifying the contents and the purpose of the test, and giving a phone number to call for further information, no inquiries were received from the public. Perhaps the baits looked so much like other refuse that they were merely passed over by trash weary urbanites.

The study determined the feasibility of an oral baiting program to immunize raccoons in an urban national park. Feasibility is only one of many factors that must be taken into account in considering such a program, however. Still to be addressed are questions concerning the need and advisability of population immunization, the role rabies is playing as a natural process, the extent of responsibility by the NPS for visitor safety, and the extension of that responsibility in an urban setting to neighbors and others. There is little doubt that NPS will continue to play a role in regional planning to eradicate rabies from the Eastern United States, since national parks will be claimed to be reservoirs for the disease.

Control Issues Remain

Many issues remain to be considered in the complex interrelationship of administrative, managerial and scientific concerns related to rabies control. The 1986 oral bait acceptance study in Rock Creek addressed only logistical and practical concerns, and indicated the technical means necessary to accomplish the job of oral immunization if it were indicated as a needed program. Otherwise, the study allowed for testing of oral baiting technology itself, in a somewhat new and different arena. Oral baiting will no doubt be increasingly used in the future as a tool in wildlife population management.

Oral baits could potentially carry vaccines against virtually any wildlife disease. They could also be used to deliver chemosterilants to control reproduction in certain populations, biomarkers for population studies, even vitamins if so desired. The list of applications will grow as technologies in related fields expand and further knowledge is acquired on how to target and reach specific populations, and perhaps even specific segments of individual populations. Clearly a significantly developing management tool, oral baiting technology promises to be of special value to the wildlife managers of our National Parks.

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