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## VERTEBRATE PEST MANAGEMENT AND CHANGING TIMES

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Everywhere one turns today there are problems. The gristmills of doom and disaster are experiencing a heyday marketing this situation as one of crisis and extinction. An advantage of being an oldster in this society is that one has the perspective to recognize that these are only problems, some simple, some complex, presenting a challenge for solution to all who will lay aside their emotions and face reality. In presenting this overview of vertebrate pest management programs, I find I must dwell too frequently on "problems." This should not be interpreted as a pessimistic outlook. Sound data with professional guidance and execution of field projects cannot long be ignored.

We will do well to recognize that better than 90 percent of our population live in urban centers and are thus removed by several generations from any firsthand knowledge of the fact that our food and fiber still has to be wrested with skill from animal and plant competitors who are perfectly capable of returning us to the stone age. When regulations governing our resource management programs are formulated at a national level, urban-oriented values such as recreation and preservation of natural elements obscure the knowledge of how dependent cities are on the rural segment of the nation for the more basic necessities of life. Add to this the almost paranoiac fear of chemicals as poisons that has occupied the press and the educational system over the past two decades. The result, justifiable frustration at the resource management level.

Dr. Carl Sagan, who produced the Cosmos series on TV, had this to say: "Where we have strong emotions we are apt to make fools of ourselves." For the past two decades emotional concern for the environment and the maintenance of all living species of life on earth has run rampant, pushing the pendulum of zero pollution and preservation of yet undeveloped areas far beyond the limits of feasible balance. The acceptance of a sound apportionment of natural resources and the techniques for their management will be met with cries of anguish and an all-out effort to maintain the priorities some score of environmental laws have provided.

Now, a bit of history. Back 60 years ago we had most of the touted integrated pest management tools for vertebrate population management that are now in popular esteem. We used them because we had little or no choice--guns, traps, snares, burrow fumigants, fencing, rodent proofing, close herding, etc. In addition, there were more full-time experienced fieldmen using these labor intensive methods, men generally better versed in the habits of particular wild species than we have available for a similar purpose today.

Strychnine, a natural plant alkaloid, was the only toxicant in general field use. Biologists spent many a man-year of research trying to overcome its defect of too rapid an onset of reactions, which limit the voluntary ingestion of a toxin. We learned that successive sublethal feedings permitted some of the targeted animals to build up a temporary tolerance for strychnine which enabled them to feed freely on treated baits without harm. Consequently, about all we succeeded in doing was to minimize crop and livestock losses in a given season. The next year, as the pest population recovered through natural reproduction, the task had to be repeated.

During the next 25 years, research provided us with thallium, zinc phosphide, the coyote-getter, Compound 1080, and the chlorinated hydrocarbons. In urban commensal rodent control we progressed from barium carbonate, phosphorus paste and arsenic, to red squill, Compound 1080, and the various anti-coagulants. For the first time we were able to achieve control of a given vertebrate population at levels with which we could live.

This varied toolkit was achieved by the late 1940s. For the past 30 years not only have we elected to withhold from use many of these chemical tools, but, more important, we have failed to come up with replacements (with some exceptions in management of bird and fish populations). On the other hand, the vertebrate populations that need to be held within acceptable limits have lost little of their recovery capability. For example, prairie dog colonies on the Buffalo Gap Natural Grasslands in Nebraska are expanding at the rate of 30 percent per year. How explosive some vertebrate populations can be is exemplified in the present jackrabbit irruption in southeastern Idaho, where only a few years prior in southern Idaho rabbits and ground squirrels were at such a low ebb as to adversely affect reproduction of raptorial birds nesting on the Snake River Birds of Prey Natural Area. As for the coyote and raccoon, give them an inch and they will take a yard, so well adapted are they in countering man's management efforts.

The public has been bombarded over the last two decades with the premise that the continued use of toxic chemicals results in a "super pest" that cannot be controlled. Thus this approach to population management is alleged to be self-defeating. However, the so-called "super pest" is nothing more than a discrete population (or individual) that acquires a defense against a particular chemical--not chemicals per se. This phenomenon is not peculiar to chemicals. We have problems with trap-wise predators and rodents. Hunting results in game that makes itself hard to find. The National Park Service is seeking to employ "conditioned aversion" to solving the grizzly bear/people encounters at Glacier National Park. Several speakers on this program will acquaint you with differing uses of this technology.

The lesson we should have learned is that there is no such thing as too many tools in our kit for wildlife management. Any tool with use and time becomes blunted and dull. For the most part, tools in our field of endeavor cannot be "sharpened" effectively but must be replaced with ones that work on a differing trait or physical component of the target species. Therefore, it is critical that new chemical controls be developed on a continuing basis, and we have not done that.

If it is so very obvious that resource management needs--in fact, must have--a continuing input of new technologies, why have we been so laggard these past 30 years? There are several reasons--all self inflicted.

First, vertebrate population management requires no large volume of chemical for any one purpose. In the trade vernacular this is a "minor use." Over the many years we have adapted chemicals to our use from research programs funded for other purposes. We have been borrowers for the most part. Fortunately, in this period, it was practical for private industry to devote more attention to minor uses for agricultural chemicals. They proffered significant help in the vertebrate pest management field in the form of candidate compounds newly synthesized.

In the mid-1960s a radical change took place, brought on by government regulation that was responding to the environmental crusade. Premarketing tests and the time it took to perform them made basic costs to introduce a "pesticide" zoom above \$5 million. In no way could a chemical company recover its investment from the limited number of pounds the vertebrate pest management programs would require.

We could still have partly compensated for this roadblock by increasing the number of required EPA tests in the government laboratories set up to serve the wildlife field. It was just such a cooperative endeavor between the Denver Wildlife Research Center and Mobay Chemical Company that brought the rodenticide GOPHACIDE on stream, and MESUROL as a bird repellent. There are other similar illustrations where the Denver laboratory has played a vital role.

Second, concurrently still another ideology captured the public's attention, "natural is good, synthetic or man-manipulated is bad." As a consequence, government research funds were largely rerouted to develop biological controls and integrated pest management systems. Gradually sufficient pressure against toxic tools that remained in the vertebrate population management program built to a point where in February 1972, by Executive Order from the White House, it became the policy of the Federal Government to restrict the use on federal lands of chemical toxicants for the control of predatory mammals and birds. No chemical-causing secondary poisoning was to be used for control of any land vertebrate. As is usual under such circumstances, so much of the research funds were drained off to retrace the findings of yesteryear, and to add largely repetitious volumes on the habits of vertebrate pests, that efforts to find new toxic chemicals ground to a virtual halt.

Third, entirely new chemical structures that find a favorable market come at relatively long intervals. As the consequence of a new structure "break thru," whole families of related compounds that substitute a side chain here or there appear within the next few years as competitors. This dilutes the opportunity of the original inventor from recovering his investment, which today can be a very considerable sum. Fortune magazine (January 1982) says: "These limitations on a company's ability to capture the rewards of innovation reduce the amount of research and development private enterprise is willing to undertake."

There are some bright spots in these last 30 years, nevertheless. We now have an effective control for the lamprey eel in the Great Lakes, plus two quite selective rough fish control compounds. In the control of birds doing crop damage, we have two toxic agents that in the hands of trained applicators minimize affects on nontarget species. The insecticide/bird repellent MESUROL is progressively finding new useful applications.

Three new anticoagulant rodenticides have been registered since 1974, and, while directed against the same physiological system, they introduce some new features. For example, TALON and MAKI have developed data indicating effectiveness against warfarin-resistant Norway rats, and both MAKI and TALON may effect kills in one feeding. A rodenticide that is based on a very different chemical structure and is not an anticoagulant will be disclosed by Drs. Jackson and Spaulding at this conference. Where control depends on voluntary acceptance of treated baits, this latter product has exceptional qualifications. It is still under experimental registration and so will not be commercially available for a while.

It is very encouraging to have two new chemical tools beginning to move into play. For example, on January 22nd of this year, TALON was approved by EPA for commensal rodent control in all use areas, indoor and out, including farm sites. It is no longer a restricted-use pesticide. Research data thus far available indicate that both of these new compounds hold promise of being useful in many other facets of vertebrate pest management.

Coming back into balanced research in vertebrate pest management is the Federal Government. In November 1981, Robert Jantzen, Director of the U.S. Fish and Wildlife Service, announced that the Service plans major revisions in the control of predatory animals. This will include stepped up development and field testing of chemicals which show promise of being effective coyote control agents. This was followed on January 29, 1982, with Executive Order No. 12342, from the White House, withdrawing the former Order No. 11643, which limited the use of toxic agents on federal lands.

So there is light at the end of the tunnel.

But after this upbeat segment I must again return to a problem, this time in relation to the use of the product after marketing registration has been achieved.

First, there is frequently a restriction requiring application only by certified users. Second, still more limiting is the requirement that the use must be under "the direct supervision of the U.S. Fish and Wildlife Service and other government agency predator control personnel," as with the M-44 coyote getter. Third, the registration may be accompanied by specific use restrictions. For example, the M-44 registration has three pages of "don'ts," 26 separate items. Item No. 9 says,

"The M-44 device shall not be used in areas where threatened or endangered animal species might be adversely affected. Each applicator shall be issued a map which clearly indicates such areas."

A recent anticoagulant label accepted by EPA in June 1980 carries this instruction:

"Do not bait within one mile radius of nesting sites being used by raptors."

This puzzled me for a while, inasmuch as the product was only registered for use in commercial and residential urban areas. Then I recalled that there is a nesting peregrine falcon on the 34th floor ledge of the Fidelity and Guaranty building in the center of Baltimore, Maryland. Peregrines have been hacked (released) into the wild from the roof of The Department of Interior, and from the tower of the Smithsonian in downtown Washington, D.C., from the top of the Royster building in Norfolk, Virginia, and from the Life Insurance Company building in Manhattan, New York. It is anticipated that the peregrines will return to these cities to nest once they have reached sexual maturity. On the other hand, these falcons feed exclusively on bird life that they catch on the wing, not rodents or carrion.

The extent to which restrictive labeling with respect to endangered species can go is illustrated by a label for a rodent burrow fumigant, registered by EPA January 19, 1982.

#### "ENDANGERED SPECIES CONSIDERATIONS

1) Black-footed Ferret - Do not use this product in areas likely to be inhabited by the Black-footed Ferret. Contact the Endangered Species Specialist at the nearest U.S. Fish & Wildlife Service office to arrange for a ferret survey of the proposed treatment site prior to use of this product. 2) Utah Prairie Dog - This product is not intended for use against the Utah Prairie Dog. 3) San Joaquin Kit Fox - This pesticide should not be used within one mile of active dens of the San Joaquin Kit Fox in the following California counties: Kern, Kings, Fresno, San Luis Obispo, Merced, Monterey, Santa Barbara, Ventura, Tulare and San Benito. Contact the California Department of Fish & Game for recommendations prior to use of this product. 4) Blunt-nosed leopard Lizard - This pesticide should not be used in the range of the Blunt-nosed Leopard Lizard in the following California counties: Kern, Fresno, Kings, Madera, Merced, and Tulare. Contact the California Department of Fish & Game for recommendations prior to use of this product. 5) Desert Tortoise - This pesticide should not be used in the critical habitat of the Beaver Dam Slope population of the Desert Tortoise in Utah. This comprises an area extending from the southwest facing slope of the Beaver Dam Mountains, across Highway 91, and west along the Arizona border 10 miles to the Nevada border. 6) Eastern Indigo Snake - Do not use this product in the range of the eastern Indigo Snake in the following states: Mississippi, Alabama, South Carolina, Georgia, and Florida."

We must not go looking for scapegoats in EPA or the U.S. Fish and Wildlife Service. The Endangered Species Act mandates that any action "authorized" by them must not pose any jeopardy to endangered or threatened species. EPA has only recently begun to take this more detailed labeling action. In a draft copy of the FIFRA Guidelines, Subpart H, entitled, LABELING REQUIREMENTS FOR PESTICIDES AND DEVICES, dated August 27, 1981, the following statement appears:

"EPA has instituted a process for evaluating hazards to endangered species...a process that may result in labeling statements of a restrictive nature. Finally, recent Agency labeling requirements have been shifted away from broad, generalized label statements that rely on the common sense interpretation of the user, but whose vagueness or ambiguity potentially negate the Agency's intentions and offer little assurance of environmental protection. It is increasingly clear, both from a legal and an enforcement standpoint, that label statements must be derived from a precise description of use parameters that define the permitted use of the product."

All this applies only to the Federal registration. Each product must also be registered in the state where used. Most states (38) have passed legislation and developed their own endangered species lists that commonly include species not found on the Federal lists. To this situation the Bureau of Land Management and the U.S. Forest Service have come up with a "sensitive species" list that is a real cliff-hanger.

Can you envision what purpose it will serve us to succeed in getting Compound 1080, or any other single-dose predator toxin registered if the terms of the Endangered Species Act, and inclusion of the many satellite lists, are fully implemented? It will be like undertaking a program designed to fail. The Endangered Species Act is undergoing hearings in the U.S. House of Representatives as this conference is being held. The Act must be refunded within the next few months. You will be well advised to give this legislation close attention.

As a profession we are committed to travel a course in the months and years ahead that is going to be anything but easy. But since you now have a "road map" charting the obstacles, let's get on with the task. One thing in our favor--we know the wildlife field.