HAZARDS TO LIVESTOCK OF INSECTICIDES USED IN MOSQUITO CONTROL

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The public has shown considerable suspicion of the activities of scientists engaged in mosquito control. Persons in charge of control projects have, from time to time, been called upon to defend their actions against the accusations of aroused farmers and veterinarians. In most cases the charges were unfair. In spite of the tons of insecticides used against the mosquitoes, there have been virtually no confirmed cases of poisoning of livestock. Why, then, is there constant suspicion? I feel that several factors are responsible. An unfavorable press, putting unreasonable blame on DDT for many of the illnesses of man and animals, aroused the public. A lack, in the early days, of assembled toxicity data gave no defense. Some veterinarians used insecticide poisoning as a diagnosis without proper consideration. Some chemists, unfamiliar with the methods of insecticide analysis, unknowingly reported outlandishly erroneous results.

Actually, mosquito control personnel should be complimented for having realized the hazards and for taking adequate precautions. Without doubt, this was accomplished by a healthy fear of the retribution in store for them if they failed, and by the need for relatively small quantities of insecticides dispersed over wide areas.

I believe difficulties can be avoided completely if you continue to make use of the available toxicity data, keep farmers and veterinarians informed of your proposed applications, work for a favorable press with factual information and train your operators to respect the rights and property of others.

The various dosages of modern insecticides required to produce intoxication of livestock are reasonably well-known and have been compiled in Technical Bulletin 1122 of the U. S. Department of Agriculture.

If we consider only the toxicity of these compounds on a milligram per kilogram basis, we may make the following groupings:

Compounds toxic at 200 mg./kg. or higher doses:

DDT, TDE, methoxychlor, Perthane and Dilan fall in this category. It is my opinion that these compounds will be involved in poisoning only when the grossest carelessness in handling occurs.

Compounds toxic at 25–200 mg./kg.:

This group would include chlordane, toxaphene, Strobane, malathion and Dipterex. These may be considered safe when used with caution, but can cause poisoning with very little carelessness.

Compounds toxic at 0.5–25 mg./kg.:

This group includes Diazinon, parathion, TEPP, EPN, lindane, dieldrin, aldrin, heptachlor, isodrin and endrin. These must be used with utmost caution at all times.

In practical application these apparent hazards are sometimes reversed. A compound, such as parathion used at 0.1 pound/acre and toxic for calves at 0.5 mg./kg., is no more dangerous than some other compound used at 4 pounds/acre and toxic at 20 mg./kg. Toxicity data must be used together with application rates.

The persistence of an insecticide as a residue must also be taken into account. A compound hydrolized in 24 hours represents a different problem from one that persists for several months.

Persistence of residues on forage or in water offers less of a hazard to the livestock than of creating an undesirable residue in the tissues of the animals. We have fed the following insecticides at the indicated levels for 112 days in all their feed with no indication of harmful effect to sheep or cattle: Heptachlor, 2.5, 10 p.p.m.; Dieldrin, 1, 2.5, 10 p.p.m.; Endrin, 2.5, 5.0 p.p.m.; Aldrin, 2.5, 5.0 p.p.m.; BHC, 100 p.p.m.; Lindane, 100 p.p.m.; DDT, 25 p.p.m.; Methoxychlor, 25 p.p.m.; Toxaphene, 25, 100 p.p.m.

Symptoms and Lesions

With chlorinated hydrocarbon insecticides such as aldrin, dieldrin, chlordane, heptachlor, toxaphene and Strobane there is usually a delay of 15 minutes to several hours before symptoms appear. The premonitory symptoms are usually hyperexcitability and increased or exaggerated response to external stimuli. Muscular spasms soon follow, involving the facial muscles, then other muscles backward over the body. Convulsions may follow and are tonic-clonic in nature. An animal may suffer one or many convulsions. Death may occur during the first convulsion, or recovery may follow many. During convulsions the body temperature rises to as high as 116° F.

Some animals show only symptoms of depression. Others alternate depression and convulsions or other activity.

Lesions at necropsy are confined to those associated with violent death—parboiled viscera, random hemorrhages and congestion. There are usually some hemorrhages on the heart, which is usually in systole, and excessive cerebrospinal fluid under pressure.

DDT, TDE and methoxychlor produce a different chain of symptoms. They are characterized primarily by tremors which increase in intensity so that the animal shivers violently. Between seizures the animal behaves as though suffering from laminitis, walking carefully and on tip-toe. Seizures may be evoked by sudden external noises and other stimuli. Necropsy lesions are primarily negative.

The organic phosphorus compounds, such as parathion, malathion, Dipterex, TEPP and others produce symptoms by interfering with cholinesterase. These compounds were developed both as insecticides and as chemical warfare agents. The principal symptoms are profuse salivation, dyspnea and a stiff-legged walk. Constriction of the pupils occurs, but is not easy to recognize in sunlight due to the normal constriction. Death is usually due to respiratory failure.

At necropsy there are practically no lesions save edema of the lungs in some cases.

The course of poisoning by this group of compounds is usually short, often only a few hours.

When controversy and accusations occur I would suggest that you proceed somewhat as follows: First, put in writing all the available information on treatments, frequency, number of animals involved, period of exposure, etc., and have the owner and others sign those records as soon as possible. It is good to take pictures, particularly motion pictures, of both the affected and unaffected animals, preferably including the owner and some identifying date. Samples of feed, ingesta and tissues should be obtained, frozen and shipped to qualified chemists. A veterinarian should take specimens for bacteriological or virological study. Finally, be a diplomat to the end. If these suggestions are followed, most disputed cases are settled in a short time.