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BOOK REVIEW . . .

Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. Milton Friend and J. Christian Franson, Technical Editors. U.S. Department of the Interior, Geological Survey, Biological Resources Division, National Wildlife Health Center, 6006 Schroeder Road, Madison, Wisconsin 53711, Information and Technology Report 1999-001, ISBN 0-607-88096-1. 1999. 426 Pages $48.00 U.S. ($60.00 foreign).

This Field Manual supercedes the *Field Guide to Wildlife Diseases. Volume 1. General Field Procedures and Diseases of Migratory Birds* published in 1987, and it more than triples the number of diseases considered. The first section covers specimen collection, preservation, shipment and history data, disease control, euthanasia and a new chapter on care and use of wildlife in field research. The section on bacterial diseases includes avian cholera, tuberculosis, salmonellosis, chlamydiosis and adds mycoplasmosis and miscellaneous bacterial diseases. Avian botulism is moved to a new section on biotoxins with algal toxins and mycotoxins added. In addition to duck plague, inclusion body disease of cranes and avian pox, the section on viral diseases is expanded to include eastern equine encephalomyelitis, Newcastle disease, avian influenza, woodcock reovirus and miscellaneous herpesviruses of birds. The section on parasitic diseases has been expanded from sarcocystis, gizzard worms, and nasal leeches to include hemosporidiosis, trichomoniasis, intestinal and renal coccidiosis, eustrongylidosis, tracheal worms, heartworm of swans and geese, acanthocephaliasis, and miscellaneous parasitic diseases. The section on chemical toxins has been expanded from lead poisoning and oil toxicosis and now includes organophosphorous and carbamate pesticides, chlorinated hydrocarbon insecticides, selenium, mercury, cyanide, salt, barbiturates, and miscellaneous chemical toxins. A section has been added on electrocution and other miscellaneous diseases. The eight appendices include a sample specimen history form, sources of diagnostic assistance in the United States, sources of supplies, normal brain cholinesterase values for various bird species, common and scientific names of birds and other animals used in the text, a list of over 80 common and chemical names, and conversion tables. There is an 11-page glossary and a 26-page index. The Manual is extravagantly illustrated with 319 color photographs, eight black and white photographs, and 187 tables, graphs, drawings, and maps. Except for the chapter on care and use of wildlife in field research, which is reprinted with minor modifications from another book, the authors of the Manual either currently are or formerly were affiliated with the National Wildlife Health Center (NWHC).

According to the Introduction, the focus of the Manual is on providing practical information about diseases for wildlife managers and field personnel, and the reader is told that, "The need to generalize . . . often results in a loss of precision for some information." Thus, although "field signs," gross lesions, and diagnoses are discussed for most of the diseases, the information lacks the technical detail and scientific quality required for a diagnostic reference, and the Manual repeatedly admonishes the reader that a diagnosis cannot be made on the basis of the information provided. Similarly, although general disease control measures are discussed, the reader is cautioned that they must be tailored by disease control specialists to specific situations.

Unfortunately, even the basic information that field personnel need to deal with disease events in wild birds frequently is flawed. For example, Chapter 2 on Specimen Collection and Preservation advises that, "If lesions are noted, collect tissue samples for microscopic examination, microbiology, toxicology, and other analyses." However, this assumes that field personnel are able reliably to recognize subtle gross lesions and to select appropriate tissues for submission, and it implies that the absence of gross lesions negates the need to submit tissues for other analyses. The problem is further compounded when the reader is told in Chapter 7 on Avian Cholera to submit tissues for culture and is referred to Chapter 2 where the only tissue collection procedure described is for specimens preserved in formalin. The figures of dissections of birds show several of the major organs but not the kidneys, despite their importance in diagnosing some diseases and their being among the more difficult organs for laymen to identify.

Chapter 3 on Specimen Shipment recommends shipping specimens in a sealed plastic bag in a Styrofoam® chest, but neglects to mention that if dry ice is used as the coolant, the bag should be ventilated to prevent the expanding CO_2 from rupturing the shipping container.

Chapter 4 on Disease Control Operations recommends incineration as the preferred method of carcass disposal and shows nine photographs and one drawing of open incineration of carcasses. However, it then mentions that

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air-quality standards often preclude open burning. Two photographs show the application of a disinfectant to outdoor areas in a duck plague control operation, but there is no mention that disinfectants generally are of limited efficacy under such conditions (Zander et al., 1997).

Chapter 5 on Euthanasia mercifully omits the crude method of holding the bird by its head while swinging its body in a circle described in the prior Field Guide, but it fails to describe the proper technique for cervical dislocation by separating the occipital condyle from the atlas (Zander et al., 1997). It also neglects to mention that, even when performed properly, cervical dislocation may not result in immediate unconsciousness (Andrews et al., 1993). The Manual then adds a patently inhumane euthanasia technique utilizing an inhalent anesthetic in a plastic syringe case with no provision for supplying air so it would result in death by hypoxia if used as described (Andrews et al., 1993).

The most serious deficiency of the Manual is the absence of documentation for the information presented. Although from two to six selected references for supplemental reading are listed at the end of each chapter, these frequently are incomplete or inappropriate for a field manual. For example, Chapter 16 on Duck Plague mentions the 1973 Lake Andes, South Dakota (USA), epizootic eight times and 18 of the 21 photographs are from that epizootic. However, it does not list either of the two peer-reviewed reports on the epizootic (Proctor et al., 1975; Pearson and Cassidy, 1997), despite the fact that one provides a detailed account of the diagnosis, epizootiology and control of this largest duck plague epizootic reported in free-flying wild waterfowl. On the other hand, it lists a 1999 paper on identifying duck plague virus by polymerase chain reaction.

The absence of documentation results in a number of unsubstantiated statements being presented as fact. This is illustrated by the chapters on the two most extensively discussed contagious diseases, avian cholera and duck plague. The Manual asserts that avian cholera is an emerging disease (a term not defined in the Glossary) of wild waterfowl, but this is the result of erroneously equating reports of diagnoses with the occurrence of disease. For example, the Manual states that avian cholera "did not appear in North American waterfowl or other water birds until 1944." However, Jensen and Price (1987), citing unpublished observations of the NWHC, point out that, "Avian cholera (pasteurellosis) was not recognized as a serious epizootic disease in wild aquatic birds until 1944 [Quortrup et al., 1946], but we would be naive to believe that this plague suddenly appeared in that year." Although avian cholera was not diagnosed in the Central Flyway of North America until 1963 (Vaught et al., 1967), McDougal et al. (1965) believe that many previous wild waterfowl mortalities in Nebraska (USA) and Missouri (USA) may have been avian cholera. In fact, the author of this chapter has stated elsewhere (Friend, 1992) that, "This disease was probably present in free-living waterfowl in the United States prior to the first documented epizootics in 1944." Paradoxically, the Manual assumes that reports of avian cholera in the United States and Canada accurately reflect the occurrence of the disease, but it then attributes the absence of reports from Mexico to a lack of surveillance.

The Manual states categorically that, "Avian cholera is highly infectious [sic] and it spreads rapidly through waterfowl and other bird populations." But Botzler (1991) points out that "the introduction of avian cholera into susceptible waterfowl populations may be common, and that most incidents of avian cholera may involve only one or a few birds and remain undetected." According to the Manual, avian cholera "has become the most important infectious bacterial disease of waterbirds," but it concedes that the impacts on populations of various species are unknown.

The reader is told that "[e]arly detection of avian cholera outbreaks is the first line of defense for controlling the disease" and "[t]he opportunity to prevent substantial losses is greatest during early stages of outbreaks." Although these statements seem intuitively logical, no examples are cited where epizootics have been aborted as the result of early detection and no data are provided demonstrating a reduction in mortality as a result of implementation of the control measures recommended. The fallacy of assuming that control measures are effective just because an epizootic ends was demonstrated when the eradication of infected coots by aerial application of a detergent was claimed to have been successful in controlling a 1975 avian cholera epizootic on Chesapeake Bay (USA) (Purseglove et al., 1976). However, Montgomery et al. (1979) later questioned the efficacy of the effort, and Botzler (1991) points out that it is not possible to evaluate the impact of depopulation in the absence of an untreated control population. Botzler (1991) also points out that, although carcass collection—the principal control measure recommended by the Manual for avian cholera epizootics—is logical, the benefits have not been definitely tested.

The Manual also claims that, "The pattern of duck plague within North America is that of an emerging disease." However, at the time the

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disease was first diagnosed in commercial ducks on Long Island, New York (USA), in 1967, Leibovitz and Hwang (1968) pointed out that "it seems out of the realm of probability that the first group of exposed birds on this continent was detected in this outbreak." In fact, L. Leibovitz (pers. comm.) had seen classical lesions of duck plague in waterfowl from Pennsylvania (USA) 11 years earlier. It is instructive to note, therefore, that the random distribution of reports of duck plague since 1967 shown in the Manual is consistent with Leibovitz's (1968) prediction three decades ago of what would be expected if the disease was not new to the American continent.

The Manual's claim that duck plague is "not an established disease in North American waterfowl" purportedly is based on the failure to detect duck plague carriers in several surveys of migratory waterfowl conducted from 1967 to 1986 and the absence of duck plague as a cause of mortality in wild waterfowl necropsied at the NWHC since 1975. However, Pearson and Cassidy (1997) have pointed out that neither serological surveys nor those based on virus isolation provide reliable information on the status of duck plague in waterfowl populations. Moreover, the NWHC has diagnosed duck plague in migratory waterfowl several times since 1975, including the 1994 epizootic that killed 1,200 wild waterfowl on the Finger Lakes (New York), a mallard (*Anas platyrhynchos*) in Saskatchewan (Canada) in 1984 (Wobeser and Docherty, 1987), a black duck (*Anas rubripes*) in Maryland (USA) in 1985 (Brand and Docherty, 1988) and a mallard in North Dakota (USA) in 1988. The claim that duck plague is not an established disease in North American waterfowl not only is unsupported by credible scientific evidence (Pearson and Cassidy, 1997), but it is contrary to prevailing scientific opinion (Wobeser, 1997), including the U.S. Fish and Wildlife Service's Duck Plague (Duck Virus Enteritis) Panel Report (Beard et al., 1984).

The Manual claims that all confirmed duck plague epizootics in migratory waterfowl have also involved commercial, avicultural, captive-raised, or feral waterfowl, implying that they were the likely source of the infection. However, Pearson and Cassidy (1997) concluded that the most probable source of the infection in the 1973 Lake Andes epizootic was other migratory waterfowl from the northeastern United States, and surveys of non-migratory waterfowl associated with the 1994 Finger Lakes epizootic failed to show evidence of duck plague in those birds.

The Manual states that a pattern of spring duck plague epizootics has been reported for captive waterfowl collections in England and may be associated with physiological changes related to the onset of breeding. However, it fails to mention that those English investigators reported a consistent association between the epizootics in captive waterfowl and contact with migratory waterfowl, particularly mallards, not only in the spring, but in the fall as well (Gough and Alexander, 1990).

The Manual recommends destruction of flocks infected with duck plague, which rarely is possible where free-flying waterfowl are involved, and decontamination of infected waters by chlorination and infected grounds by raising the pH or burning, neither of which has been demonstrated to be of significant value (Pearson and Cassidy, 1997; Zander et al., 1997).

Except for mentioning the administration of antitoxin for botulism and antibiotics for salmonellosis, the Manual contains little information on the treatment of diseases in birds. Even in the case of oil contamination of plumage where the diagnosis can be relatively straight-forward and field personnel might look to the Manual for information on cleaning techniques, they are instead referred to State wildlife agencies for advice.

The relevance of Appendix D listing normal brain cholinesterase levels for several species of birds is questionable in a manual for refuge managers and field biologists, particularly when Chapter 39 on Organophosphorus and Carbamate Pesticides warns that, because of variations in results, it is important not to attempt to interpret brain cholinesterase results from different laboratories or methods.

Two figures cite references which do not appear in the supplemental reading lists for the chapters, and errors in terminology compromise the professional quality of the text. For example, terms such as "highly infectious," "infectious dose" and "pathology" are used incorrectly several times in the text. The Glossary incorrectly defines "immunity," which is a condition acquired by individuals, as resistance, which is a genetic trait of species, and it incorrectly defines hypersensitivity as an abnormal sensitivity to stimuli or biological agents, rather than as an exaggerated immune response. Despite their lacking established epizootiologic definitions but being used routinely throughout the text, the terms "outbreak" and "die-off" are not defined in the Glossary. However, the Glossary does define such terms as "domestic duck," "fly larvae," "livestock" and "poultry."

Although the profuse illustrations make the Manual visually appealing and many will be helpful to wildlife managers and biologists, others are redundant or superfluous. Indeed, it is readily apparent that only a government agency

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would consider publishing such a lavishly illustrated book for such a limited audience.

Many chapters are well-written and provide interesting and frequently useful information. However, the numerous technical flaws and unsubstantiated statements preclude a recommendation of the Manual as a reference source on diseases of wild birds for refuge managers, field personnel and others lacking the expertise to recognize its deficiencies.

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