

Disease Prevention in Commercial Aviaries¹

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The prevention of disease in commercial aviaries requires an understanding of how disease organisms are spread. The common ways that disease organisms enter aviaries are by people, equipment, newly introduced birds, pests and stress.

Disease Transmission

People

People can spread disease to birds in aviaries by two methods; they may be directly infected or they may serve as mechanical carriers. Man may be directly infected with some disease organisms which also infect birds and shed these organisms to the birds. Examples include *Candida*, *E. coli*, *Salmonella* and others. Man may also simply transport disease organisms (mechanical transmission) on his footwear, clothing, hair, hands, etc. For example, if someone visits an aviary where birds are shedding Pacheco's virus, Psittacosis, or another disease organism and then visits your aviary, there is a good possibility of disease transmission to your birds. To decrease the probability of disease spread to an aviary, one needs to limit visitors. For those who must enter the aviary, be sure they have not visited other aviaries that day. If they have, a shower and clean (including footwear) are a must.

Contaminated Equipment

Disease organisms may also be transmitted on contaminated equipment. Never borrow or share equipment between aviaries unless it can be properly cleaned and disinfected. If

cages or other equipment are borrowed from a neighboring aviary where birds are shedding disease organisms, the disease can be brought in on the contaminated equipment. Remember, disease organisms can remain viable for variable periods or time outside the bird in the aviary. For example, the Psittacosis organism can remain infectious for approximately one month in the aviary environment. It is strongly recommended to not share or borrow aviary equipment. However, if one must, they properly clean and disinfect the equipment before bringing it to the aviary. The length of time disease organisms remain infectious outside the bird depends on inherent characteristics of the organism, ambient temperature, exposure to direct sunlight, and other factors.

Newly Introduced Birds

Newly introduced birds may also bring disease into the aviary. Remember, a bird may appear healthy but still be infected with a shed disease organism. A good example would be the Pacheco's disease virus. In addition, a bird may be in the incubation stage of a disease and appear healthy, only after exposing all the birds in the aviary does the bird develop the clinical disease. For example, birds have been shown to be infected with and intermittently shed the Psittacosis organism for as long as 1.5 years before becoming clinically affected. This concept also applies to birds taken to shows, swap days, or other meetings where they are in contact with birds from other aviaries. Precautions need to be taken when introducing new birds into an aviary or when birds are returned following a show.

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Pests

Pests may also play a significant role in disease transmission. Pests include rodents, wild birds, and insects. Pests can introduce disease organisms into an aviary by mechanical transmission or by being directly infected with and shedding the organisms. For example, if rodents have access to the feed bins, they may defecate in the feed, contaminating it with many potential pathogens such as *Salmonella*, *E. coli*, etc. Efforts must be made to control pests in and around the aviary.

Stress

The last factor listed as a significant means of disease transmission is stress. This factor should probably be considered the most important. Birds in a low stress environment are resistant to disease challenge. Aviaries in which birds are stressed experience severe losses when disease challenge occurs. In addition, such flocks typically have chronic problems with opportunist organisms (always present but only cause disease when birds' immune systems are not functioning properly) such as *E. coli*, *Candida*, and others. Efforts must be directed toward identifying stress conditions in the aviary and eliminating them.

Air

Another means of disease transmission commonly described is the airborne route. In reality, this is of importance only within aviaries where birds are in very close contact. Transmission of disease organisms through the air between aviaries even 50 feet apart is of little significance. When a disease challenge occurs, one needs to investigate the means of transmission described above to determine how the organism gained entrance.

Disease Prevention

Most disease problems encountered in commercial aviaries are related to poor management practices. The conditions under which birds are maintained have a major influence on their health. Successful aviculturists learned many years ago that effective quarantine procedures, appropriate aviary design, adequate pest control, and proper hygiene/sanitation practices are essential to maintaining healthy birds. As is obvious, when describing an effective disease prevention program, this is synonymous with factors relating to an effective management program. That is, if one has an effective management program, there will be few disease problems in the aviary.

A Basic Disease Prevention Program

A basic program of Disease Prevention in Commercial Aviaries will be described. Factors considered will include 1) stress, 2) quarantine/acclimation, 3) aviary design, 4) feed/water quality, and 5) miscellaneous. These factors will be discussed from a disease prevention perspective only.

Stress

Stress describes the physiologic response of an animal when adverse conditions are encountered. This could include overcrowding, unfavorable temperature and humidity, changes in the diet, establishing a new pecking order, ability to hide from real or perceived threats, etc. Stress allows the bird to adapt to changes more effectively, thus stress is a positive factor. However, when stress becomes long-term and the bird is unable to overcome or adapt to the stress, this will lead to a decreased resistance to disease. Investigators have consistently demonstrated that most birds which die in exotic bird collections, die from disease organisms of low virulence such as Candidiasis (sour crop). This organism is always present in the bird, but stress lowers the bird's natural resistance which allows the disease organism to multiply in an uncontrolled manner. Many birds are also carriers of such feared disease organisms as the Pacheco virus or *C. psittaci* (Psittacosis). The immune system of healthy birds may keep these disease organisms in check. However, when the birds are stressed, these organisms can then multiply and be shed to other birds in the aviary resulting in a disease outbreak. For example, it has been estimated that 1 percent of the wild bird population is infected with Psittacosis and act as carriers. However, there appears to be no significant disease outbreaks in the wild population. The clinical disease outbreaks appear to be precipitated by man-made conditions in the aviary.

Stress can be reduced by recognizing the basic behavioral needs of the different types of birds in the aviary. Consider factors such as cage design, noise control, placing of compatible birds, adequate diet, decreasing boredom, and good sanitation. By reducing stress, the birds are better able to cope with disease challenge.

Quarantine/Acclimation

All aviculturists know the importance of purchasing only healthy birds and from only reputable sources. Although it is tempting to purchase bargain-priced stock, the potential dangers are great. The birds may be smuggled or sick. Remember, there has to be a reason a bird is being sold for below fair market value. Even when purchasing birds from

a reputable source, all new stock should be isolated from the main collection for at least 60 days. Birds in isolation should be fed last and separate clothing worn when working in the area.

When birds are brought into the quarantine area, a complete physical examination should be performed, including recording body weights. If the birds remain healthy during their quarantine, they can then be moved to the permanent collection. The stress of the quarantine period may reveal disease problems too subtle to recognize on the pre-quarantine evaluation. If one's collection is valuable, a disease survey may also be performed during the quarantine period. Birds may be tested for infection with Newcastle disease and Chlamydiosis. Since birds may be intermittent shedders of these organisms, several fecal samples or cloacal swabs should be collected from each bird and pooled. A serologic test is also available for Chlamydiosis. A Gram stain of feces can be done to determine if the microfloral population of the gut is abnormal, that is, are there large numbers of gram negative bacteria or yeasts. Feces should be examined for the presence of intestinal parasite ova. Birds should be dusted to remove any external parasites.

When a collection is extremely valuable, additional testing may be performed on the birds in quarantine. A complete blood count and chemistry may reveal subtle health problems, as well as provide reference data for later use since normal values have not been established for many common species. The feces can be cultured to screen for specific potential pathogens such as *Salmonella*, *Pseudomonas*, etc. Asymptomatic carriers of a number of viral diseases may be identified by the above described tests. However, if one plans to introduce conures into a valuable collection, these birds should be tested for the presence of Pacheco's disease virus. This can be done by placing feces from the test conure into the drinking water of a sentinel bird such as a budgerigar or cockatiel throughout the quarantine period.

The quarantine period should also be used to acclimate birds to local conditions and adapt them to the diet. If birds are from warm tropical areas, gradually expose them to cooler conditions. For example, in the tropics Macaws enjoy bathing in the warm tropical rains. Macaws do not have highly water repellent feathers. If the temperature outside is cold, this can be a problem. These birds may need to be moved to an indoor shelter to dry out, until they learn to take cover during cold rains.

Aviary Design

The design of the aviary is an important factor in disease control. The old cage design consisted of large walk-in flight cages. Experience has not suggested cages be constructed of welded wire and be suspended 3 to 4 feet above a concrete floor. Advantages to this design include:

1. droppings fall through the cage floor so birds are not in direct contact with them
2. the fecal-oral transmission cycle of many parasites is disrupted
3. reinfection with pathogenic fecal-transmitted organisms is reduced
4. spilled feed falls through flooring, out of the bird's reach
5. cages are not entered so less chance of disease transmission
6. birds are disturbed less cages are easily cleaned

Although this design has many inherent advantages, suspended cages may not be suitable for highly excitable birds which need to hide (toucans) or aggressive species (Sulphur-crested Cockatoos) which need to escape their aggressive mate. The cage material least suitable is wood as it is difficult to properly clean and disinfect and is readily chewed.

The preferred flooring material for aviaries is concrete. Concrete is easy to clean and disinfect, birds cannot dig-out, and rodents cannot dig-in. The concrete should be sealed to maintain impermeability of the surface. Sand is also an acceptable flooring material for suspended cages.

The arrangement of birds within the aviary is very important from a disease prevention perspective. Birds should be separated according to their continent of origin. For example, Australian Cockatoos are very susceptible to the Pacheco's disease virus, while the South American Conures are recognized as common carriers of this virus. Birds should also be separated according to their susceptibility to potential diseases. Pigeons are recognized as common carriers of the Psittacosis organism and should not be mixed with psittacines.

Aviaries should have a sick room. The room should be well-lit, heated to 85-90 degrees F, and should be isolated from the main collection. The sick room should not be located in the main aviary where the sick birds can readily

transmit disease organisms to other birds. Likewise, the sick room should be isolated from the quarantine room. All feed bowls, water bowls, and other utensils should be restricted to use in the sick room and routinely cleaned and disinfected.

Feed and Water Quality

Maintaining a high quality feed and water supply is an integral part of any disease prevention program. A build-up of potentially pathogenic organisms in the aviary environment may lead to disease outbreaks in stressed or immunocompromised birds. In many seed-eating birds, gram-positive organisms predominate. In a poorly managed aviary, the birds may be exposed to overwhelming numbers of gram-negative organisms. It is essential that the quality of feed and water supplies be maintained and sources of potential contaminants recognized.

Feed quality must be maintained. Birds do not always eat food immediately after it is offered. Although intact fruits and vegetables are fairly stable, cut fruits and vegetables at room temperature for 24 hours allow growth of large numbers of gram-negative bacteria and molds. If birds are stressed, exposure to organisms can lead to serious disease problems.

Seeds and grains are very stable when stored properly. However, if they become damp or humidity is high, they can support the growth of massive numbers of yeasts and bacteria. Soaking of seeds for sprouting is a common practice. However, improper soaking provides an excellent environment for the growth of bacteria and molds. If soaking is practiced in the aviary, the seeds being soaked should be maintained in an air-conditioned environment (approximately 75 degrees F), not at 95 degrees F in the garage. This will greatly reduce the build-up of bacteria and molds.

Water quality must be maintained in aviaries. *Pseudomonas* and *Alcaligenes* are common contaminants of water. *E. Coli* and other coliforms may be at high levels locally where untreated well water is used. If well water is provided as the source of drinking water in the aviary, it should be tested by a local laboratory for bacterial counts. If the levels are elevated, the water system should be treated (for example - chlorine at 5 ppm). Although adult birds can adjust to high levels of *E. coli* or other coliforms in the drinking water, babies may develop clinical disease resulting in mortality. Drinking water for the birds should be collected directly from the tap instead from a garden hose. Very high levels of bacteria can build-up quickly in the hose. If a hose

treatment must be used, flush the hose for approximately five minutes to reduce the bacterial load prior to dispensing the water.

Miscellaneous Factors

Additional miscellaneous factors to consider for a comprehensive disease prevention program will be described. Nesting material, if contaminated, can expose babies to high levels of potential disease-causing organisms. Nesting material should be kept dry and changed frequently. A good nesting material is wood shavings. Peat moss or potting soil should be avoided as they support the growth of fungi and bacteria. Following any disease outbreak, the nesting material should be changed and the nest boxes cleaned and disinfected. Foot baths, for disinfecting boots, should be maintained at the entrance of the aviary, at the sick bird room and the quarantine area. This will help reduce the chance of someone tracking a disease organism into the aviary or from tracking it from one part of the aviary to another. Drinking water should be changed daily. Water bowls should be cleaned and disinfected at least once per week, more often if vitamins are added to water. Bowls containing seeds should be cleaned and disinfected one or two times per month. Bowls containing fruit and soft foods should be cleaned and disinfected daily as they provide an excellent media for bacterial growth.

The proper use of disinfectants is essential to maintain adequate aviary sanitation. For a disinfectant to be of value in the aviary, it must be active against the disease organisms (bacteria, viruses, molds, mycoplasmas, etc.) In the environment, it must come into contact with the organisms, and it must come into contact for a sufficient period of time. When disinfecting aviary cages, flooring, feed or water bowls and other utensils, first clean them with soap and water to remove all dirt. Many disinfectants are inactivated in the presence of organic material. After cleaning, then apply the disinfectant and allow it to dry onto the surface. Disinfectants do not kill all disease organisms on contact, but require time. If disinfectants are immediately washed off after applying, many viable organisms may remain.

Aviary visitors should be kept to an absolute minimum. Not only may they bring diseases into the aviary, but they also upset the birds. All necessary visitors should be provided coveralls and boots. If visitors have been to other aviaries the same day, a shower should be required. If Newcastle disease or other contagious diseases are present in the area, do not permit visitors onto the premises.

Much of the mortality in commercial aviaries can be eliminated by good management practices and by early recognition of disease problems. Aviculturists commonly experience elevated mortality in their birds and accept this as normal. However, in aviaries where management practices are excellent, the normal mortality level is very low. Recognizing disease problems in aviaries is often difficult as birds, by their nature, hide their disease. Often, a disease process is far advanced before it is recognized by the owner. Birds need to be observed closely every day to identify problems in their early stages. When a sick bird notices that it is being observed, it assumes an alert posture. Therefore, the birds need to be approached quietly. Sick birds typically have fluffed feathers, dull eyes, abnormal posture, and may be isolated from the group. The character of the dropping should be evaluated and feed consumption determined. If a bird is suspected of being sick, it should immediately be quarantined and isolated. Every effort should be made to have the problem quickly diagnosed, and the remaining birds should be closely observed for disease spread.

The periodic use of prophylactic antibodies in aviaries should be discouraged unless a specific disease agent is identified. Routine antibiotic administration may result in the development of resistant bacterial strains and disrupt the birds' normal microflora.

Following any disease outbreak, the aviary should be cleaned and disinfected. Many disease organisms can remain infectious for weeks to months in the aviary and reinfect birds once treatment is stopped. Cleaning and disinfection are needed to remove and/or kill disease organisms in the environment.

Effective preventive medicine procedures are part of a good aviculture management program and are essential to the success of any aviary.