

Section 8: Avian zoonotic disease prevention

- 8-1 Compendium of measures to control *Chlamydophila psittaci* infection among humans (psittacosis) and pet birds (avian chlamydiosis) (NASPHV and AAV fact sheet)
- 8-2 Avian influenza, surveillance and testing program in WA State (slides, fact sheet)
- 8-3 Backyard Biosecurity Practices to Keep Your Birds Healthy (USDA brochure)
- 8-4 West Nile Virus (PHSKC fact sheet)

Information & resources

National Association of State Public Health Veterinarians (NASPHV)

8-1 Compendium of measures to control *Chlamydophila psittaci* infection:
www.nasphv.org/documentsCompendia.html

Information about Avian Influenza

United States Department of Agriculture

8-3 www.aphis.usda.gov/animal_health/birdbiosecurity/biosecurity/

Public Health – Seattle & King County (PHSKC)

Avian Influenza Q & A: www.kingcounty.gov/healthservices/health/ehs/avianflu.aspx

Avian Flu Response Plan: See Appendix G, “Response to Avian Influenza Outbreak in Birds”: www.kingcounty.gov/healthservices/health/preparedness/pandemicflu/plan.aspx

Centers for Disease Control and Prevention (CDC)

Information about avian influenza in humans: www.cdc.gov/flu/avian/

Washington State Department of Agriculture

Information about avian influenza in domestic poultry:

agr.wa.gov/FoodAnimal/AnimalHealth/Diseases/AvianInfluenza/default.asp

Animal premise registration: Phone: (360) 902-1860, online registration:

agr.wa.gov/FoodAnimal/Animal_Premise/NAIS.htm

U.S. Geological Survey (USGS) National Wildlife Health Center

www.nwhc.usgs.gov/disease_information/avian_influenza/index.jsp

Information about West Nile Virus

Public Health – Seattle & King County

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www.kingcounty.gov/healthservices/health/communicable/diseases/WestNileVirus.aspx

www.kingcounty.gov/healthservices/health/ehs/westnile.aspx

Dead bird reporting in King County: Phone: (206) 205-4394

Website: www.kingcounty.gov/healthservices/health/ehs/westnile/deadbird.aspx

Centers for Disease Control and Prevention

www.cdc.gov/ncidod/dvbid/westnile/index.htm

WA State Department of Health: Health Education Resource Exchange (HERE):

fortress.wa.gov/doh/here/materials/HERE_Materials.aspx

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NATIONAL ASSOCIATION of STATE PUBLIC HEALTH VETERINARIANS, INC.

TO: State Public Health Veterinarians
State Epidemiologists
State Veterinarians
Interested Pet Bird Professionals

FROM: Kathleen A. Smith, DVM MPH
Chair, Psittacosis Compendium

RE: *Compendium of Measures To Control Chlamydophila psittaci Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2009*

On behalf of the National Association of State Public Health Veterinarians, I am pleased to provide you with a copy of the *Compendium of Measures to Control Chlamydophila psittaci Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2009*. The Compendium committee and consultants believe these updates and revisions will aid public health officials, physicians, veterinarians, and the pet bird industry to control this disease in birds and in people.

This Compendium updates the 2008 Compendium. Notable changes in the 2009 Compendium are as follows:

Infection in Humans, Laboratory Testing

- At the time of this report, microimmunofluorescence (MIF) testing kits will no longer be available through FOCUS Diagnostic Laboratories. As a result, the committee recommends that the individual laboratories listed in Table 1 be contacted directly to ascertain the testing options they provide for human specimens.

Appendix 1: Testing Methods for *C. psittaci* in Birds:

- Elementary Body Agglutination (EBA) testing is no longer being offered by Texas Veterinary Medical Diagnostic Laboratory. It is still described under the section titled “Tests for antibodies” as other laboratories may conduct this test in the future

Appendix 2: Treatment Options for Birds with Avian Chlamydiosis:

- The “Recommendations for Treating and Caring for Infected and Exposed Birds” section was moved from the Prevention and Control Recommendation section in the main document to the beginning of Appendix 2. These recommendations are critical for

treatment success and placing them in the treatment section ensures a greater likelihood that they will be reviewed.

- A statement was added that it is important for avian facility managers to provide employees with simple, concise written treatment procedures to ensure treatment success.
- More emphasis is placed on recommending doxycycline over other tetracycline antibiotics for the treatment of avian chlamydiosis
- Routine prophylactic antibiotic treatment is now discouraged as it may cause adverse effects and could generate resistant strains of *C. psittaci* and other bacteria.

The final, and probably the most significant, update is that the Centers for Disease Control and Prevention (CDC) and the University of Georgia College of Veterinary Medicine have collaborated on the development of a new diagnostic test for *C. psittaci*.ⁱ

Genetic studies have indicated that there are at least seven avian genotypes of *C. psittaci*. Distinguishing these serotypes currently requires multiple confirmatory tests and is very time consuming. A real-time polymerase chain reaction (PCR) assay, targeting the ompA gene has been developed which uses Light Upon extension (LUX™) chemistry and high resolution melt (HRM) analysis that can accurately and quickly differentiate these genotypes. This test may become a valuable epidemiologic tool to evaluate human outbreaks and link human/avian transmission in the future. The CDC is interested in applying this diagnostic tool in select cases or outbreaks. Therefore, if you have suspect human cases and are willing to submit samples for molecular testing, please contact:

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Medical Epidemiologist, Respiratory Diseases Branch
Centers for Disease Control and Prevention
1600 Clifton Road NE, MS C-23
Atlanta, GA 30333
Tel: 404-639-4747
Fax: 404-639-3970
Email: dvj3@cdc.gov

To help control this disease and protect public health, the Compendium committee and its consultants encourage you to distribute this 2009 version of the Compendium to health officials, veterinarians, and the pet bird industry in your state and actively promote the document as a standard. We would also like to request that if you update any web links to this document that you please delete any previous Compendiums, as we want to ensure that interested people access the most current version.

This document will be reviewed and updated on an as needed basis. The most recent version, along with sample case report forms and associated client materials can be accessed on the National Association of State Public Health Veterinarians website at <http://www.nasphv.org>.

ⁱ Mitchel, S.L. Wolf, B.J. et al, Genotyping of *Chlamydomphila psittaci* using Real-Time PCR and High Resolution melt Analysis. *J Clin Microbiol* 2009;47:175-181

Compendium of Measures To Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2009

National Association of State Public Health Veterinarians (NASPHV)

SUMMARY

Psittacosis, also known as parrot fever and ornithosis, is a bacterial infection of humans that can cause severe pneumonia and other serious health problems. It is caused by *Chlamydophila psittaci*, formerly known as *Chlamydia psittaci*. From 2002 through 2007, 91 human cases of psittacosis were reported to the Centers for Disease Control and most resulted from exposure to infected pet birds, usually cockatiels, parakeets, parrots, and macaws. In birds, *C psittaci* infection is referred to as avian chlamydiosis. Infected birds shed the bacteria through feces and nasal discharges, and humans become infected from exposure to these materials. This compendium provides information about psittacosis and avian chlamydiosis to public health officials, physicians, veterinarians, the pet bird industry, and others concerned with controlling these diseases and protecting public health. The recommendations in this compendium provide standardized procedures for controlling avian chlamydiosis in birds, a vital step to protecting human health. This document will be reviewed and revised as necessary.

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Compendium of Measures To Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2009

National Association of State Public Health Veterinarians (NASPHV)

INTRODUCTION

Chlamydophila psittaci is a member of the family *Chlamydiaceae*. Currently there are eight serovars and nine genotypes described which in the future may prove of importance in the epidemiology of the disease in animals and humans¹. In some cases, these obligate intracellular bacteria can be transmitted from birds to humans. In humans, the resulting infection is referred to as psittacosis (also known as parrot fever and ornithosis). Psittacosis typically causes influenza-like symptoms and can lead to severe pneumonia and nonrespiratory health problems. With appropriate treatment, the disease is rarely fatal. From 2002 to 2007, 91 human cases of psittacosis were reported to the CDC (mean 15, range 12-21)². This is likely an underrepresentation of the actual number as milder cases may not seek medical attention or be reported. Persons at risk include those exposed to pet birds, pigeons, and poultry and in specific occupations such as laboratory and wildlife workers. Human infection can result from brief exposure to infected birds or their contaminated excretions or secretions.

In this compendium, *C psittaci* infection in birds is referred to as avian chlamydiosis. Chlamydial organisms have been isolated from over 460 bird species from 30 orders³ but are most commonly identified in psittacine (parrot-type) birds, especially cockatiels and budgerigars (also called parakeets or budgies). Among caged, nonpsittacine birds, infection with *Chlamydiaceae* organisms occurs most frequently in pigeons and doves. Avian chlamydiosis can occur but is infrequently diagnosed in canaries and finches.⁴ The recommendations in this compendium provide standardized procedures for controlling avian chlamydiosis in the pet bird population, an essential step in efforts to control psittacosis among humans. This compendium is intended to guide public health officials, physicians, veterinarians, the pet bird industry, and others concerned with the control of *C psittaci* infection and the protection of public health.

INFECTION IN HUMANS (PSITTACOSIS)

Transmission

The disease resulting from *C psittaci* infection in humans is called psittacosis and most infections are typically acquired from exposure to psittacine birds. Transmission has also been documented from poultry and free-ranging birds, including doves, pigeons, birds of prey and shore birds. Infection with *C psittaci* usually occurs when a person inhales organisms that have been aerosolized from dried feces or respiratory tract secretions of infected birds. Other means of exposure include mouth-to-beak contact and handling infected birds' plumage and tissues. Even brief exposures can lead to symptomatic infection; therefore, certain patients with psittacosis might not recall or report having any contact with birds. Currently, pet birds are thought to pose a low risk to immunocompromized persons.⁵ Person-to-person transmission has been suggested but not proven.⁶ Standard infection-control precautions are sufficient for humans with psittacosis, and specific isolation procedures (e.g., private room, negative pressure air flow, and masks) are not indicated.

Clinical Signs and Symptoms

The onset of illness typically follows an incubation period of 5 to 14 days, but longer periods have been reported. The severity of the disease ranges from inapparent illness to systemic illness with severe pneumonia. Before antimicrobial agents were available, 15% to 20% of humans with *C psittaci* infection died. Currently, mortality is extremely rare. Humans with symptomatic infections typically have abrupt onset of fever, chills, headache, malaise, and myalgia. They usually develop a nonproductive cough that can be accompanied by

breathing difficulty and chest tightness. A pulse-temperature dissociation (fever without increased pulse rate), enlarged spleen, and nonspecific rash are sometimes observed. Auscultatory findings may underestimate the extent of pulmonary involvement. Radiographic findings may include lobar or interstitial infiltrates. The differential diagnosis of pneumonia caused by psittacosis includes infection with *Coxiella burnetii*, *Histoplasma capsulatum*, *Mycoplasma pneumoniae*, *Legionella* spp, *C. pneumoniae* or other *Chlamydiaceae*, and respiratory viruses such as influenza. *Chlamydophila psittaci* can affect organ systems other than the respiratory tract, resulting in endocarditis, myocarditis, hepatitis, arthritis, keratoconjunctivitis, encephalitis, and more recently, ocular adnexa lymphoma.⁷ Severe illness with respiratory failure, thrombocytopenia, and hepatitis has been reported.

Case Definition

The CDC and the Council of State and Territorial Epidemiologists (CSTE) have established case definitions for epidemiologic surveillance.⁸ These definitions should not be used as the sole criteria for establishing a clinical diagnosis or determining medical management. A patient is considered to have a confirmed case of psittacosis if clinical illness is compatible with psittacosis and the case is laboratory confirmed by one of three methods:

- *C psittaci* is cultured from respiratory secretions,
- there is a 4-fold or greater increase in antibody against *C psittaci* by complement fixation (CF) or microimmunofluorescence (MIF) to a reciprocal titer of ≥ 32 between paired acute- and convalescent-phase serum samples, or
- there is presence of immunoglobulin M antibodies against *C psittaci* by MIF to a reciprocal titer of ≥ 16 .

A patient is considered to have a probable case of psittacosis if clinical illness is compatible with psittacosis and the patient is epidemiologically linked to a confirmed case (either an avian case or has common exposure with another human case) or the patient has supportive serology (e.g., a single antibody titer of ≥ 32 , detected by CF or MIF in at least one serum sample obtained after onset of symptoms).

Diagnosis

Most diagnoses are established by clinical presentation and positive antibodies against *C. psittaci* in paired sera using MIF. The MIF is more sensitive and specific than the previously used CF tests; however, there is still some cross-reactivity with other chlamydiae, such as *C. pneumoniae*, *C. trachomatis*, and *C. felis*. Acute-phase serum specimens should be obtained as soon as possible after onset of symptoms, and convalescent-phase serum specimens should be obtained at least two weeks after the first specimen. Because antimicrobial treatment can delay or diminish the antibody response, a third serum sample 4-6 weeks after the acute sample might help confirm the diagnosis. Acute and convalescent sera should be tested simultaneously at the same laboratory.

The infectious agent can also be isolated from the patient's sputum, pleural fluid, or clotted blood during acute illness and before treatment with antimicrobial agents; however, culture of *C. psittaci* is performed by few laboratories because of technical difficulty and safety concerns. Certain polymerase chain reaction (PCR) assays can be used to document organism nucleic acid in clinical samples to distinguish *C psittaci* from other chlamydial species and to genotype *C. psittaci* amplicons.⁹ Because proper sample collection techniques and handling are critical for obtaining accurate test results, clinical laboratories should be contacted for specifics on specimen submission.

Laboratories that Test Human Specimens for *Chlamydiaceae*

Information about laboratory testing is available from state public health departments. Few commercial laboratories have the capability to differentiate chlamydial species by MIF. Certain laboratories accept human specimens to confirm *C. psittaci* infection (Table 1). Other sources might be available.

Table 1: Laboratories that test human specimens for *Chlamydophila psittaci*

Laboratory	Tests Performed	Telephone Number Website
Focus Diagnostics (Quest subsidiary) Cypress, CA	MIF (IgM, IgA, IgG) Culture	(800) 445-4032 www.focusdx.com
Laboratory Corp of America Burlington, NC	MIF (IgM, IgG) Culture	(800) 222-7566 www.labcorp.com
Specialty Labs, Santa Monica, CA	MIF (IgM, IgG, IgA) PCR (pleural fluid only)	(800) 421-4449 www.specialtylabs.com
Viomed Minnetonka, MN	MIF (IgG, IgM) Culture	(800) 582-0077 www.viomed.com
Response and Surveillance Laboratory, Respiratory Diseases Branch, CDC Atlanta, GA **	MIF (requires paired sera), PCR, Culture, genotyping (multiple specimen types)	(404) 639-4921

*MIF = microimmunofluorescence, PCR = polymerase chain reaction assay

**CDC is a reference laboratory and samples must be submitted through State Health Departments

Treatment

Tetracycline antibiotics are the drug of choice for *C. psittaci* infection in humans. Mild to moderate cases can be treated with oral doxycycline (100 mg every 12 hours) or tetracycline hydrochloride (500 mg every six hours) for a minimum of 10 days. Severely ill patients should be treated with IV doxycycline hyclate (4.4mg/kg/day divided into two infusions, maximum 100 mg/dose). Antibiotic therapy should be continued for at least 10-14 days after fever abates. Most *C. psittaci* infections are responsive to antibiotics within 1-2 days, however relapses can occur. Although in-vivo efficacy has not been determined, macrolide antibiotics are considered the best alternative agents in patients for whom tetracyclines are contraindicated (e.g. children <8 years of age, pregnant women, and persons allergic to tetracyclines).¹⁰

INFECTION IN BIRDS (AVIAN CHLAMYDIOSIS)

Transmission

C. psittaci is excreted in the feces and nasal discharges of infected birds. The organism is environmentally labile but can remain infectious for over a month if protected by organic debris (e.g., litter and feces). Some infected birds can appear healthy and shed the organism intermittently. Shedding can be exacerbated by stress factors, including reproductive activities, relocation, shipping, crowding and chilling.

Clinical signs

The usual duration between exposure to *C. psittaci* and onset of illness ranges from 3 days to several weeks. However, active disease can appear with no identifiable exposure. Whether the bird has acute or chronic signs of illness or dies depend on the species of bird, virulence of the strain, infectious dose, stress factors, age and extent of treatment or prophylaxis.

Signs of avian chlamydiosis are non-specific and include lethargy, anorexia and ruffled feathers. Other signs include serous or mucopurulent ocular or nasal discharge, diarrhea and excretion of green to yellow-green urates. Severely affected birds may become anorectic and produce sparse, dark green droppings, followed by emaciation, dehydration and death.

Case Definitions

Clinical signs may not always be evident in all infected birds. A confirmed case of avian chlamydial infection is defined on the basis of one of the following:

- isolation of *C. psittaci* from a clinical specimen,

- identification of chlamydial antigen by use of immunofluorescence (fluorescent antibody) on the bird's tissues,
- a ≥ 4 -fold change in serologic titer in two specimens from the bird obtained at least two weeks apart and assayed simultaneously at the same laboratory, or
- identification of *Chlamydiaceae* within macrophages in smears or tissues (e.g. liver, conjunctival, spleen, respiratory secretions) stained with Gimenez or Macchiavello stain. Clinical signs may not be evident.

A probable case of avian chlamydial infection is defined as compatible illness and one of the following:

- a single high serologic titer as defined by the laboratory in a specimen obtained after onset of signs or
- *Chlamydiaceae* antigen (identified by use of enzyme-linked immunosorbent assay [ELISA], PCR, or fluorescent antibody) in feces, a cloacal swab specimen or respiratory tract or ocular exudates.

A suspected case of avian chlamydial infection is defined as:

- a compatible illness that is not laboratory confirmed but is epidemiologically linked to a confirmed case in a human or bird,
- a bird with no clinical signs and a single high serologic titer or detection of chlamydial antigen,
- compatible illness with positive results from a nonstandardized test or a new investigational test, or
- compatible illness that is responsive to appropriate therapy.

Diagnosis

Several diagnostic methods are available for identifying avian chlamydiosis in birds (see Appendix 1)

Treatment

Treatment should be supervised by a licensed veterinarian (see Appendix 2).

PREVENTION AND CONTROL RECOMMENDATIONS

Aviary and pet shop owners are encouraged to implement recommendations such as those described in the Model Aviary Program.¹¹ Such programs encourage disease prevention and improve animal health and the human-animal bond. To prevent transmission of *C. psittaci* to humans and birds, specific control measures are recommended:

- **Educate persons at risk.** Inform all persons in contact with birds or bird-contaminated materials about the zoonotic nature of the disease. By the time infection is recognized in a group of birds, a critical period for pathogen accumulation and dissemination has already occurred. Bird caretakers with respiratory or influenza-like symptoms should seek medical attention and inform their health care provider about bird contact.
- **Protect persons at risk.** When cleaning cages or handling potentially infected birds, caretakers should wear protective clothing, which includes gloves, eyewear, a disposable surgical cap, and an appropriately fitted respirator¹² with N95 or higher rating. Surgical masks might not be effective in preventing transmission of *C. psittaci*. In addition, necropsies of potentially infected birds should be performed in a biological safety cabinet. Wet the carcass with detergent and water to prevent aerosolization of infectious particles.
- **Maintain accurate records of all bird-related transactions for at least one year to aid in identifying sources of infected birds and potentially exposed persons.** Records should include the date of purchase, species of birds purchased, individual bird identification, source of birds, and any identified illnesses or deaths among birds. In addition, the seller should record the name, address, and telephone number of the customer and individual bird identification (e.g., band or microchip number).
- **Avoid purchasing or selling birds that have signs consistent with avian chlamydiosis.** Signs are nonspecific and may include lethargy, ocular or nasal discharge, diarrhea, ruffled feathers or low body weight.

- **Avoid mixing birds from multiple sources.** To prevent epornitics (disease outbreaks) and pathogen transmission to humans, additional control and prevention methods (e.g. health screening, extended quarantine) may be required when birds from multiple sources are mixed.
- **Quarantine newly acquired or exposed and isolate ill birds.** Isolation should include housing in a separate air space from other birds and noncaretakers. Quarantine birds, including those that have been to shows, exhibitions, fairs, and other events for at least 30 days and test before adding them to a group.
- Test birds before they are to be boarded or sold on consignment. House them in a room separate from other birds pending test results (see Appendix 1).
- **Screen birds with frequent public contact (e.g., bird encounters, long term care facilities, schools).** Such testing may be used to reduce potential human exposure from birds. Specific protocols should be established in consultation with a veterinarian, recognizing that some birds may demonstrate persistent IgG antibodies in the absence of active infection (see Appendix 1).
- **Practice preventive husbandry.** Position cages to prevent the transfer of fecal matter, feathers, food, and other materials from one cage to another. Do not stack cages and be sure to use solid-sided cages or barriers if cages are adjoining. The bottom of the cage should be made of a wire mesh. Substrate/litter that will not produce dust (e.g., newspapers) should be placed underneath the mesh. Clean all cages, food bowls, and water bowls daily. Soiled bowls should be emptied, cleaned with soap and water, rinsed, placed in a disinfectant solution, and rinsed again before reuse. Between occupancies by different birds, cages should be thoroughly scrubbed with soap and water, disinfected, and rinsed in clean running water. Exhaust ventilation should be sufficient to prevent accumulation of aerosols and prevent cross contamination of rooms.
- **Control the spread of infection.** Isolate birds requiring treatment. Rooms and cages where infected birds were housed should be cleaned immediately and disinfected thoroughly. Workers should wear appropriate protective clothing. When the cage is being cleaned, transfer the bird to a clean cage. Thoroughly scrub the soiled cage with a detergent to remove all fecal debris, rinse the cage, disinfect it (most disinfectants require 5-10 minutes of contact time) and rerinse the cage to remove the disinfectant. Discard all items that cannot be adequately disinfected (e.g., wooden perches, ropes, nest material, substrate/litter). Minimize the circulation of feathers and dust by wet-mopping the floor frequently with disinfectants and preventing air currents and drafts within the area. Reduce contamination from dust by spraying the floor with a disinfectant or water before sweeping it. A vacuum cleaner or pressure washer may aerosolize infectious particles and should be used with caution. Frequently remove waste material from the cage (after moistening the material), and burn or double-bag the waste for disposal. Care for healthy birds before handling isolated or sick birds. There is no documented transmission of *C. psittaci* via ventilation systems from pet bird aviaries or pet stores to humans, nor are there any studies specific for *C. psittaci* viability in these systems. Properly maintained ventilation systems are at low risk of harboring *C. psittaci*.¹³ Theoretically, desiccation from forced air movement may reduce viability of the organism. Use of a high efficiency particulate air (HEPA) filter on air system return may be an option to reduce particulate matter in the air.
- **Use disinfection measures.** All surfaces should be thoroughly cleaned of organic debris before disinfection. *C. psittaci* is susceptible to many disinfectants and detergents as well as heat; however, it is resistant to acid and alkali. Examples of effective disinfectants include 1:1,000 dilution of quaternary ammonium compounds (e.g., Roccal[®], Zephiran[®]), 1% Lysol[®] or freshly prepared 1:32 dilution of household bleach (½ cup/gallon). Many disinfectants are respiratory irritants for both humans and birds and should be used in a well-ventilated area. Avoid mixing disinfectants with any other product.

Recommendations for Treating and Caring for Infected and Exposed Birds

All birds with confirmed or probable avian chlamydiosis should be isolated and treated, preferably under the supervision of a veterinarian (Appendix 2).

Responsibilities of bird owners, physicians, and veterinarians

Humans exposed to birds with avian chlamydiosis should seek medical attention if they develop influenza-like symptoms or other respiratory tract illnesses. The physician should consider psittacosis in ill patients exposed to birds and collect specimens for laboratory analysis if indicated. Psittacosis in humans is a Nationally Notifiable Disease¹⁴ and most states require physicians to report cases of psittacosis to the

appropriate state or local public health authorities. Early and specific treatment for psittacosis should be initiated. Timely diagnosis and reporting can help identify the source of infection and control the spread of disease. Local and state public and/or animal health authorities may conduct epidemiologic investigations and institute additional disease control measures. Birds that are suspected sources of human infection should be referred to veterinarians for evaluation and treatment.

Veterinarians should consider a diagnosis of avian chlamydiosis for any lethargic bird that has nonspecific signs of illness, especially if the bird was recently purchased. If avian chlamydiosis is suspected, the veterinarian should submit appropriate laboratory specimens to confirm the diagnosis. Laboratories and attending veterinarians should follow local and state regulations or guidelines regarding case reporting. Veterinarians should work closely with authorities on investigations and inform clients that infected birds should be isolated and treated. In addition, they should educate clients about the public health hazard posed by *C. psittaci* and the appropriate precautions that should be taken to avoid the risk for transmission.

Local and state epidemiologic investigations

Local health authorities should report suspected cases to their state health department.¹⁵ Public health and animal health authorities at the local or state level may need to conduct cooperative epidemiologic investigations to control the transmission of *C. psittaci* among humans and birds. An epidemiologic investigation should be initiated if a bird with confirmed or probable avian chlamydiosis was either:

- procured from a pet store, breeder, or dealer within 60 days of the onset of signs of illness;
- linked to a person with confirmed or probable psittacosis; or
- associated with several other suspect avian cases from the same source.

Other situations can be investigated at the discretion of the appropriate local or state public health department or animal health authorities.

Investigations involving recently purchased birds should include a visit to the site where the infected bird is located and identification of the location where the bird was originally procured (e.g., pet shop, dealer, breeder, or quarantine station). Authorities should document the number and types of birds involved, the health status of potentially affected persons and birds, locations of facilities where birds were housed, relevant ventilation-related factors and any treatment protocol.¹⁶ Suspect birds should be tested as recommended (Appendix 1). Examination of sales records for follow up of other birds that had contact with the infected bird may be considered.

Quarantine of birds

Depending on the state's regulatory authority, animal or public health officials may issue a quarantine for all affected and exposed birds on premises where *C. psittaci* infection has been identified. The purpose of imposing a quarantine is to prevent further pathogen transmission. Reasonable options should be made available to the owners and operators of pet stores. Preferably, the owner of quarantined birds should treat the birds in a separate quarantine area to prevent exposure to the public and other birds. Alternatively, and with the approval of authorities, the owner can sell the birds after at least 7 days of treatment, provided that the new owner agrees in writing to continue the quarantine and treatment and is informed of the disease hazards. After completion of the treatment or removal of the birds, quarantine can be lifted after the premises are thoroughly cleaned and disinfected. Environmental testing can be valuable in evaluating the effectiveness of cleaning and disinfection. The area can then be restocked with birds.

Bird importation regulations

Large-scale commercial importation of psittacine birds from foreign countries ended in 1993 with the implementation of the Wild Bird Conservation Act.¹⁷ Limited importation of personal pets and avicultural specimens is permitted at this time. Illegally imported (smuggled) birds are a potential source of *C. psittaci* infection to domestic birds and people. The United States Department of Agriculture, Animal Plant Health and Inspection Service, Veterinary Services still regulates the legal importation of pet birds to ensure that exotic poultry diseases are not introduced into the United States.¹⁸ These regulations are set forth in the Code of Federal Regulations, Title 9, Chapter 1. Current minimum treatment protocols under these regulations are not always sufficient to resolve infection in all birds.

Appendix 1

TESTING METHODS FOR *C. PSITTACI* IN BIRDS

Bacteria are classified as *Chlamydophila psittaci* on the basis of shared biochemical characteristics and genome composition. The individual chlamydial organisms that meet these classification criteria are not identical and represent life forms that have evolved, and continue to evolve, through infection of both ancient and naïve hosts. Diversity in the organism, the level of exposure, and the host response may cause spurious test results in some individual animals.

Diagnosis of avian chlamydiosis can be difficult, especially in the absence of clinical signs. A single testing method might not be adequate. Therefore, use of a combination of culture, antibody-detection and antigen-detection methods is recommended, particularly when only one bird is tested. Although there is no epidemiologic evidence of increased risk to young, elderly, or immunocompromised humans, more rigorous testing should be considered for birds in contact with these individuals. Consultation with an experienced avian veterinarian may help when selecting tests and interpreting results. Because proper sample collection techniques and handling are critical for obtaining accurate test results, clinical laboratories should be contacted for specifics on specimen submission.

Pathologic diagnosis

In birds with avian chlamydiosis, cloudy air sacs and enlargement of the liver and spleen may be observed, but no specific gross lesion is pathognomonic. Chromatic or immunologic staining of tissue or impression smears can be used to identify organisms in necropsy and biopsy specimens.

Bacteriologic culture

Use of culture is recommended to avoid limitations associated with other tests. Tissue specimens from the liver and spleen are the preferred necropsy specimens. In live birds, combined conjunctival, choanal and cloacal swab specimens or liver biopsy specimens are ideal for diagnosis. Live birds being screened for *C psittaci* might not shed the microorganism daily. Therefore, to optimize recovery, serial fecal specimens should be collected for 3 to 5 consecutive days and pooled for submission as a single sample.

Chlamydophila species are obligate intracellular bacteria that must be isolated in tissue culture or embryonating chicken eggs. Specialized laboratory facilities and training are necessary for reliable identification of chlamydial isolates and adequate protection of microbiologists. The diagnostic laboratory should be contacted for specific procedures required for collection and submission of specimens. The proper handling of specimens is critical for maintaining the viability of organisms for culture, and a special transport medium is required. Following collection, specimens should be refrigerated and sent to the laboratory packed in ice but not frozen.

Tests for antibodies

A positive serologic test result is evidence that the bird was infected by *Chlamydiaceae* at some point, but it might not indicate that the bird has an active infection. False-negative results can occur in birds that have acute infection when specimens are collected before seroconversion. Treatment with an antimicrobial agent can diminish the antibody response. However, IgG titers may persist following successful treatment.

When specimens are obtained from a single bird, serologic testing is most useful when signs of disease and the history of the flock or aviary are considered and serologic results are compared with white blood cell counts and serum activities of liver enzymes. A >4-fold increase in the titer of paired samples or a combination of a titer and antigen identification is needed to confirm a diagnosis of avian chlamydiosis.

- **Elementary-body agglutination (EBA)** - The elementary body is the infectious form of *C psittaci*. Elementary-body agglutination is commercially available and detects IgM antibodies, an indicator of early infection. Titers >10 in budgerigars, cockatiels, and lovebirds and titers >20 in larger birds are frequently detected in cases of recent infection. However, increased titers can persist after treatment is completed.

- **Indirect Fluorescent Antibody Test (IFA)** - Polyclonal secondary antibody is used to detect host antibodies (primarily IgG). Sensitivity and specificity varies with the immunoreactivity of the polyclonal antibody to various avian species. Low titers may occur because of non-specific reactivity.
- **Complement fixation (CF)** - Direct CF is more sensitive than agglutination methods. False-negative results are possible in specimens from parakeets, young African gray parrots, and lovebirds. High titers can persist after treatment and complicate interpretation of subsequent tests. Modified direct CF is more sensitive than direct CF.

Tests for antigen

Tests for antigen detect the organism. These tests give rapid results and do not require live, viable organisms; however, false-positive results from cross-reacting antigens can occur. False-negative results can occur if there is insufficient antigen or if shedding is intermittent. As with all nonculture tests, results must be evaluated in conjunction with clinical findings.

- **Enzyme-Linked Immunosorbent Assay (ELISA)** - ELISA tests were originally developed for identification of *Chlamydia trachomatis* in humans. The exact sensitivity and specificity of these tests for identifying other *Chlamydiaceae* are not known. They are now occasionally used to identify suspected *C. psittaci* in birds. If a bird has a positive ELISA result but is healthy, the veterinarian should attempt to verify that the bird is shedding antigen via isolation of the organism. When a clinically ill bird has a negative ELISA result, a diagnosis of avian chlamydiosis cannot be excluded without further testing (e.g., culture, serologic testing or polymerase chain reaction [PCR] assay).
- **Fluorescent Antibody Test (FA)** - Monoclonal or polyclonal antibodies, fluorescein staining techniques and fluorescent microscopy are used to identify the organism in impression smears or other specimens. These tests have similar advantages and disadvantages to ELISA. This test is utilized by some state diagnostic laboratories.

Tests for DNA

Numerous laboratories offer diagnostic testing using polymerase chain reaction assay (PCR). PCR amplification can be sensitive and specific for detection of target DNA sequences in collected specimens (e.g., combined conjunctival, choanal and cloacal swab specimens and blood). Results differ between laboratories because there are no standardized PCR primers and laboratory techniques and sample handling may vary. Because of the sensitivity of the assay, samples for PCR must be collected using techniques to avoid contamination from the environment or other birds. PCR does not differentiate between viable and nonviable microorganisms. Test results must be interpreted in light of clinical presentation and other laboratory tests.

Additional tests

Additional diagnostic techniques are in use or under development. Readers are encouraged to research peer-reviewed reports on such tests before use.

Laboratories that test avian specimens for *C psittaci*

Table 2 lists government and university laboratories that perform chlamydial diagnostic tests. There are numerous private laboratories that provide similar services. Inclusion in Table 2 does not imply endorsement by the National Association of State Public Health Veterinarians or constituent institutions.

Table 2: Laboratories that test avian specimens for Chlamydiaceae

Laboratory	Tests Performed*	Telephone Number Website
Diagnostic Center for Population and Animal Health, Michigan State University, East Lansing, MI	Culture, PCR	(517) 353-2296 www.dcpah.msu.edu
Comparative Pathology Laboratory, University of Miami, Miami, FL	ELISA (antigen), IFA PCR	(305)585-6303 www.pathology.med.miami.edu
Infectious Diseases Laboratory (IDL), University of Georgia College of Veterinary Medicine, Athens, GA	Culture PCR, IFA	(305) 585-6303 www.vet.uga.edu/sams/idl
Veterinary Medical Diagnostic Laboratory (VMDL) College Station, TX	Culture, PCR, DCF	(979) 845-3414 http://tvmdlweb.tamu.edu/
Diagnostic Virology Lab, National Veterinary Service Laboratory (NVSL), VS, APHIS,USDA, Ames IA**	CF, Culture	(515) 663-7551 http://www.aphis.usda.gov/animal_health/lab_info_services/about_dvl.shtml

*CF = Complement fixation, EBA = Elementary body agglutination, ELISA= Enzyme-linked immunosorbent assay, IFA = Immunofluorescent antibody, PCR =Polymerase chain reaction assay, DCF – Direct compliment fixation, DCF = Direct florescent antibody

**NVSL is a USDA reference laboratory and samples must be submitted through State Veterinary Diagnostic Laboratories

Appendix 2

TREATMENT OPTIONS FOR BIRDS WITH AVIAN CHLAMYDIOSIS

Routine prophylactic antibiotic treatment is highly discouraged as it may cause adverse effects and could generate resistant strains of *C. psittaci* and other bacteria

Treatment of avian chlamydiosis can be difficult. Although treatment protocols are usually successful, knowledge is evolving and no protocol ensures safe treatment or complete elimination of infection in every bird. Therefore, treatment for avian chlamydiosis should be supervised by a licensed veterinarian after consultation with an experienced avian veterinarian.

General Recommendations for Treating and Caring for Infected and Exposed Birds

- The recommended treatment period for avian chlamydiosis has historically been 45 days, except in budgerigars where 30 days of treatment can be effective.
- Avian facility managers should provide employees with simple, concise written treatment procedures to assure treatment success.
- Sick birds may consume inadequate amounts of medicated food or water, so they should be initially treated with drugs delivered directly by mouth or injection.
- Protect birds from undue stress (e.g., chilling, relocation), poor husbandry, and malnutrition. These problems reduce the effectiveness of treatment and promote the development of secondary infections with other bacteria or yeast.
- Observe the birds daily, and weigh them every 3 to 7 days. If the birds are not maintaining weight, have them reevaluated by a veterinarian.
- Remove oyster shell, mineral blocks, and cuttlebone during treatment. High dietary concentrations of calcium and other minerals inhibit the absorption of tetracyclines. In hand-fed neonates where dietary calcium is required, the calcium and tetracycline should be given at least 4 to 6 hours apart
- Isolate birds that are to be treated in clean and uncrowded cages.
- Good husbandry practices should be followed to prevent opportunistic infections:
 - clean up all spilled food promptly
 - wash food and water containers daily.
 - provide appropriate vitamins daily.
- Continue medication for the full treatment period to avoid incomplete resolution of the infection.
- Birds may have reduced chlamydial shedding within days of treatment initiation.
- Treated birds can be reinfected; therefore contaminated aviaries should have a final thorough cleaning and disinfection several days before treatment ends.
- Post-treatment testing should be conducted no sooner than two weeks after treatment is completed.

Treatment Using Doxycycline

Doxycycline is presently the drug of choice for treating birds with avian chlamydiosis. It is better absorbed and more slowly eliminated than other tetracyclines. This allows doxycycline to be effective with lower drug doses (improving palatability with food or water-based administration) or administered less frequently (improving ease of treatment). Treated birds should be monitored for signs of doxycycline toxicosis. Toxicosis can cause general signs of illness (signs of depression, inactivity and decreased appetite), green- or yellow-stained urine and altered results of hepatic tests (high serum activities of aspartate aminotransferase and lactate dehydrogenase and high serum concentration of bile acids). If toxicosis occurs, administration should be stopped and supportive care provided until the bird recovers. Treatment with a different regimen or lower doxycycline dose can be started at a later date. Below are several options for treatment. Options should not be combined in the same day.

- **Doxycycline medicated feed for budgerigars and cockatiels**—It is critical to use the recommended doxycycline formulation and dietary ingredients to achieve safe and effective results. The following medicated diet¹⁹ can be used to treat avian chlamydiosis:
 1. Mix 1 part cracked steel-cut oats with 3 parts hulled millet (measured by volume).
 2. To each kilogram of oat-seed mixture, add 5 to 6 mL of sunflower oil. Mix thoroughly to coat all seeds.
 3. Add 300 mg of doxycycline hyclate (from capsules) per kilogram of oat-seed-oil mixture, and mix thoroughly to ensure that oats and seeds are evenly coated.

Prepare fresh medicated oat-seed-oil mixture daily because doxycycline stability in this diet is unknown. Feed as the sole diet. The oats and hulled millet seed are available at health food stores. Small-sized millet should be selected. Sunflower oil is available in grocery stores. Doxycycline hyclate capsules are available in 50- and 100-mg sizes.

- **Doxycycline medicated water**—Results of pharmacologic studies indicate that doses of 200 to 400 mg of doxycycline hyclate/L of water for cockatiels, 400 to 600 mg/L for Goffin’s cockatoos, and 800 mg/L for African gray parrots will maintain therapeutic concentrations.^{20,21} Research data are lacking for other species, but empiric use of 400 mg/L of water has been successful for many psittacine birds. Medicated water should be prepared daily and provided in clean bowls, rather than water bottles. Do not use medicated water for budgerigars as it will not maintain therapeutic concentrations.¹⁶
- **Orally administered doxycycline**—Doxycycline is the drug of choice for oral administration; either the monohydrate or calcium-syrup formulations can be used. Dosage recommendations are as follows: 25 to 35 mg/kg every 24 hours for cockatiels, 25-50 mg/kg for Senegal parrots, blue-fronted and orange-winged Amazon parrots; and 25 mg/kg every 24 hours for African gray parrots, Goffin’s cockatoos, blue and gold macaws and green-winged macaws. Precise dosages cannot be extrapolated for other species; however, 25 to 30 mg/kg every 24 hours is the recommended starting dosage for cockatoos and macaws, and 25 to 50 mg/kg every 24 hours is recommended for other psittacine species. If the bird regurgitates or refuses the drug, another treatment method should be used.
- **Injectable doxycycline**— The only suitable doxycycline formulation for intramuscular injection is Vibramycin SF IV^a (Vibrovenos[®]),^a a specific European formulation that can be imported into the U.S. (Table 3). It is effective if administered at doses of 75 to 100 mg/kg, IM, every 5 to 7 days for the first 4 weeks and subsequently every 5 days for the duration of treatment. This formulation can cause irritation at the injection site, but it is usually tolerated. Other injectable doxycycline hyclate formulations may cause severe tissue reactions if given IM.

Alternative treatment regimens

- **Injectable Oxytetracycline** - Limited information exists to guide the use of an injectable, long-acting oxytetracycline product LA-200.^b Current dosage recommendations are as follows: SC injection of 75 mg/kg every 3 days in Goffin’s cockatoos, blue-fronted and orange-winged Amazon parrots, and blue and gold macaws.²² This dosage might be suitable for other species but has not been tested. This product causes irritation at the site of injection and is best used to initiate treatment in ill birds or those that are reluctant to eat. After stabilization with oxytetracycline treatment, the birds should receive another form of treatment to reduce the irritation that is caused by repeated oxytetracycline injection.

a. Pfizer Laboratories, London, England

b. Pfizer Laboratories, Exton, Penn.

- **Chlortetracycline (CTC) Medicated Feed** - Chlortetracycline medicated feed has historically been used for flock treatment, however doxycycline regimens are preferred. If used, CTC medicated feed should be the only food provided to the birds during the entire treatment. Birds' acceptance of medicated feed is variable. Thus, food consumption should be monitored. Acceptance can be enhanced by first adapting the birds to a similar, nonmedicated diet. Treatment begins when the birds accept the medicated feed as the sole food in their diet. The following options are available:
 - Medicated mash diets (i.e., >1% CTC with <0.7% calcium) prepared with corn, rice, and hen's scratch.²³
 - Pellets and extruded products containing 1% CTC can be used. They are available and appropriate for use with pet birds. Select a pellet size appropriate for the size of bird being treated.^{24, 25}
 - A special diet might be necessary for lorries and lorikeets, which feed on nectar and fruit in the wild.²⁶

Treatment Methods Not Recommended

Use of water medicated with chlortetracycline (Aureomycin), oxytetracycline (Terramycin) or other tetracycline products (except doxycycline) is not recommended. These products may reduce water consumption, are not likely to be effective and may interfere with disease testing.

Sources of Medications

The following sources (Table 3) are not listed as an endorsement of the companies or products. Other sources might be available.

Table 3: Sources of medication for avian chlamydiosis

Contact	Product	Telephone Number Website
DOXYCYCLINE		
Local pharmacies	1. Doxycycline hyclate capsules 50 & 100 mg 2. Doxycycline calcium oral suspension 3. Doxycycline monohydrate oral suspension 4. Vibramycin 50 & 100 mg capsules	
Dr. Gerry M. Dorrestein Wilhelminalaan 19A 5512BJ Vessem The Netherlands	Vibramycin SF I.V.*	Tel: 000 316 11057602 Fax: 000 313 02533131 dorresteingm@planet.nl
MEDICATED FEED		
Avi-Sci Inc., St. Johns, MI	Chlortetracycline, 1%	Tel: 800.942.3438 mike@avi-sci.com
Roudybush, Paso Robles, CA	Chlortetracycline, 1%	Tel: 800.326.1726 www.roudybush.com
Ziegler Brothers Inc. Gardners, PN	Chlortetracycline, 1% (special order, 50# minimum)	Tel: 800.841.6800 www.zeiglerfeed.com
CHLORTETRACYCLINE POWDER		
Fort Dodge Animal Health Fort Dodge, IA	Aureomycin, (chlortetracycline hydrochloride) soluble powder concentrate, 4 oz packets	Tel: 800.685.5656 fdorder@FDAH.com
Phibro Animal Health Fairfield, NJ	CLTC 100 (Chlortetracycline hydrochloride), 22% (100 gm/lb)	Tel: 888.403.0074 www.phibroah.com
Agrilaboratories Inc. St. Joseph, MO	CTC (Chlortetracycline hydrochloride), soluble powder, 25.6 oz. packet (102 g CTC)	Tel: 800.542.8916 www.agrilabs.com
TETRACYCLINE POWDER		
Agrilaboratories Inc. St. Joseph, MO	Tetra – bac 324 (Tetracycline hydrochloride), soluble powder, 324 g/lb concentration	Tel: 800.542.8916 www.agrilabs.com
OXYTETRACYCLINE POWDER		
Agrilaboratories Inc. St. Joseph, MO	Agrimycin – 343 (Oxytetracycline hydrochloride), soluble powder, 343 g/lb concentration	Tel: 800.542.8916 www.agrilabs.com

*Investigational New Animal Drug Application (INADA) is no longer required, Contact the FDA at (301) 594-0796 about obtaining a personal import letter.

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- ¹⁵ Sample Human Psittacosis Case Report <http://www.nasphv.org/documentsCompendia.html>
- ¹⁶ Sample Avian Chlamydiosis Case Report; <http://www.nasphv.org/documentsCompendia.html>
- ¹⁷ Wild Bird Conservation Act of 1992, Title I of PL 102–440. 16 US Code 4901–4916. Available at: <http://international.fws.gov/permits/web%20list%20wbca.htm>.
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Additional Resources

General Public (Fact Sheets)

Medline Medical Encyclopedia: Psittacosis; US National Library of Medicine and National Institute of Health
<http://www.nlm.nih.gov/medlineplus/ency/article/000088.htm>

Psittacosis, Technical Information; Center for Disease Control and Prevention
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/psittacosis_t.htm

Psittacosis in Birds and People Public Health Fact Sheet; Massachusetts Department of Public Health
http://www.mass.gov/Eeohhs2/docs/dph/cdc/factsheets/psittacosis_birds_people.pdf

Psittacosis Fact Sheet: Public Health: Seattle and King Counties
<http://www.kingcounty.gov/healthservices/health/communicable/diseases/psittacosis.aspx>

Medical and Public Health Professionals

Ohio Dept. of Health Infectious Disease Control Manual <http://www.odh.ohio.gov/pdf/IDCM/psitta.pdf>

Psittacosis Control Guidelines for Local Health Departments; Virginia Dept of Health
<http://www.vdh.virginia.gov/epidemiology/DEE/otherzoonosis/documents/Psittacosis/Psittacosis%20for%20LHD%20revApr06%20e.pdf>

WebMD’s “emedicine” site <http://www.emedicine.com/med/topic1951.htm>

Occupational Health and Safety

Hazard Information Bulletin on psittacosis; Occupational Safety and Health Association
http://www.osha.gov/dts/hib/hib_data/hib19940808.html

Safety Services; Occupational Health; Animal Care and Use Occupational Health Program, University of California, Davis <http://safetyservices.ucdavis.edu/occupational-health-services/acu/educational-materials/psittacosis/?searchterm=psittacosis>

Psittacosis: Bioterrorism Agent Profiles for Health Care Workers; Arizona Department of Health <http://www.azdhs.gov/phs/edc/edrp/es/pdf/psittacosisset.pdf>

Psittacosis; Canadian Center for Occupational Health and Safety
<http://www.ccohs.ca/oshanswers/diseases/psittacosis.html>

Veterinarians and Animal Professionals

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Manual of Diagnostic Tests and Vaccines for Terrestrial Mammals; World Organization of Animal Health or OIE
http://www.oie.int/eng/normes/mmanual/A_00105.htm

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Psittacosis; Center for Food Security and Public Health, Iowa State University
<http://www.cfsph.iastate.edu/Factsheets/pdfs/psittacosis.pdf>

Psittacosis; State of New Jersey Department Of Agriculture
<http://www.state.nj.us/agriculture/divisions/ah/diseases/psittacosis.html>

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Avian Chlamydiosis in Birds

Text adapted from "Chlamydiosis in Birds" brochure, provided by the Association of Avian Veterinarians (AAV). Please contact AAV for copies at: AAV Publications Office Phone: 817-428-7900, Fax: 817-485-4800, Email: aavpublication@aav.org

Avian chlamydiosis, formerly called ornithosis, and most commonly known to human physicians as psittacosis, or (archaic) parrot fever, is a common disease of many bird species and is caused by the organism *Chlamydophila psittaci*. Owners should be fully informed of the implications for their pet birds and the potential for transmission to humans.

TRANSMISSION

Transmission of the disease between birds is primarily through inhalation of contaminated dust from droppings or feathers. Risk of infection is increased by close contact with infected birds that are shedding the organism. For this reason, infected birds that are stressed through shipping, overcrowding, or malnourished will have a greater tendency to shed the organism. Infected birds may shed the organism even if no clinical signs of disease are observed.

CLINICAL SIGNS

The common visible clinical signs of avian chlamydiosis are respiratory and/or gastrointestinal in nature. Lime-green diarrhea associated with inflammation of the liver is not an uncommon feature of this illness. Some birds may show general signs of illness such as lack of appetite, weight loss, depression, diarrhea, discharge from the eyes or nares, or even death. The same general signs listed above are not specific to birds infected with the *Chlamydophila psittaci* organism and are described in avian patients diagnosed with a number of other diseases. Some birds that are actively infected with *Chlamydophila psittaci* may be mildly affected or show no signs of illness at all. Immunosuppression may exacerbate clinical illness. Breeding birds can pass the organism to their young. Baby birds are more susceptible to severe infection than adult birds and may die in the nest or soon after weaning.

DIAGNOSIS

A confirmed diagnosis of avian chlamydiosis in a live bird is often difficult to obtain and depends on the species, length of time since exposure, and general condition of the bird. The most commonly used diagnostic tests include the polymerase chain reaction (DNA-PCR) assay, serology, and culture of the organism. A negative test does not guarantee that a bird is not infected – birds may shed the organism intermittently. Therefore, a negative test may need to be repeated. Current recommendations are that more than one type of test be used when trying to diagnose avian chlamydiosis in a suspect bird. These results should be considered, along with the bird's condition and history, in order to achieve a tentative or confirmed diagnosis. Some veterinarians recommend treatment of all suspected clinical cases with or without a positive laboratory test result. The biggest concern with treatment is the lack of compliance by the bird owner in completing the recommended course of medication.

TREATMENT

If avian chlamydiosis has been diagnosed, or if treatment has been recommended by your veterinarian, all exposed birds in the household should be treated at the same time to reduce the spread or recurrence of the disease. It is imperative that infected birds be isolated during treatment and that certain sanitary measures be employed to prevent spread or reinfection of the disease. The success of treatment depends on all of the medication being given in the recommended dosage and time frame. Antibiotic dosage and feeding should be directed by your veterinarian to ensure adequate levels are being consumed. There are several ways to administer medication: by mouth, by injection, by mixture of the antibiotic in soft foods or drinking water, or through commercially available medicated pellets. Depending on the condition of the patient, other supportive treatment may also be recommended. Your veterinarian will discuss the most appropriate treatment for your bird. Antibiotic treatment must be continued for a minimum of 30- 45 days, depending on species to be effective. During treatment the owner must:

- clean the premises with an appropriate disinfectant;
- use caution when handling droppings and cage debris, take care not to stir up dust while cleaning, keep dust and feather circulation to a minimum to avoid transmission to humans or other birds;
- separate/isolate and seek medical care for other birds showing signs of disease;
- avoid contact with the birds by elderly, pregnant, sick or very young persons, immunosuppressed persons or persons on anti-rejection drugs;
- remove all mineral supplements containing calcium as calcium interferes with the usefulness of the medication;
- reduce stress in the bird's environment as much as possible; and
- follow all treatment instructions as prescribed by your veterinarian.

TRANSMISSION TO HUMANS

Avian chlamydiosis *is* transmissible from birds to humans, although the incidence of transmission is rare considering the high incidence of infection in birds. If anyone in the household with an infected bird develops persistent flu-like symptoms, respiratory distress, fever, chills, headache, weakness, or fatigue, that person should seek the advice of a physician as soon as possible. Treatment is simple and most often successful in humans, but neglect of the symptoms or delayed diagnosis may result in serious illness, especially in immunocompromised persons or those with other underlying medical conditions. *Chlamydophila psittaci* is not the same organism that causes genital chlamydia infection in humans.

PREVENTIVE MEASURES

The following recommendations help reduce the incidence of avian chlamydiosis in flocks or companion birds:

- immediately after purchase, take all newly-acquired birds to an avian veterinarian for chlamydiosis screening tests;
- buy birds from suppliers who routinely screen their birds for the presence of *Chlamydophila psittaci* or who are willing to stand behind the health of their birds in some manner (health guarantee);
- isolate and quarantine all newly acquired birds for a minimum of six weeks;
- maintain appropriate preventative health management as recommended by your avian veterinarian.

AI Emergency Plans & WSDA AI Surveillance Activities

Washington State Department of
Agriculture

Division of Animal Services
Avian Health Program



Emergency Poultry Disease (EPD) Management Plan

- WSDA developed in cooperation with:
 - Washington Poultry Advisory Committee
 - U.S. Department of Agriculture, Veterinary Services
- Diseases addressed:
 - Highly Pathogenic Avian Influenza (HPAI)
 - Low Pathogenic Avian Influenza (LPAI)
 - Other emergent poultry diseases deemed a significant Foreign Animal Disease (FAD) by USDA (e.g., Exotic Newcastle Disease)



Washington State Actions

- *Press Release*
 - Issued by WSDA Director:
 - When a **presumptive** diagnosis of an EPD is made in a state other than Washington
- *Emergency Border Restriction Alert*
 - Issued by WSDA Director:
 - When a **confirmed** diagnosis of an EPD in the poultry industry in another state



Washington State Actions

- Governor's Proclamation of an Animal Disease Emergency within Washington (or a bordering state)
 - A **confirmed** outbreak of an EPD within the state would initiate the full involvement of the state Emergency Management Division
 - Support will be available from other state agencies and USDA to fulfill the EPD Response Plan



EPD Priority Levels

- Priority III – **Suspicion** of an EPD
- Priority II – **Presumptive Positive** Diagnosis of an EPD
- Priority I – EPD is **Highly Likely** or **Confirmed**



Priority III (Suspicion of an EPD)

- Based on results of a Foreign Animal Disease (FAD) investigative condition
 - Epidemiological factors indicate the condition is most likely an endemic condition
- WSDA Initial Decision Group (State Veterinarian's office) **may** issue a hold order until preliminary laboratory test results are received



Priority III (Suspicion of an EPD)

- Commercial poultry producers are required to support the diagnostic surveillance program by timely submission of appropriate specimens
- Non-commercial bird owners are requested to report sick birds
- When the initial diagnosis is **suspicious**
 - Restrict movement on and off the premise
 - Limit flock management to specific individuals



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Priority II (Presumptive Positive)

- Known investigative information makes it **possible** that the observed condition is an EPD
- Cannot be distinguished from an endemic disease / condition
- A **presumptive positive diagnosis** is received from a local laboratory or National Veterinary Services Laboratory



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Priority II (Presumptive Positive)

- Actions by State Veterinarian—
 - Initial Decision Group will be activated as necessary (State Veterinarian, Federal AVIC, etc.)
 - Notify appropriate state and federal officials
 - Activate state task force to issue quarantines and start control activities
 - Confirm appropriate samples have been sent to the National Veterinary Services Laboratory (NVSL)



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Priority II (Presumptive Positive)

- Actions by the WSDA Poultry Emergency Board—
 - Call an immediate meeting
 - Partner with the State Veterinarian's office in determining the quarantine orders and zones
 - Assist the State Veterinarian with industry knowledge and needs



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Priority I (Highly Likely)

- Known investigative information makes it **highly likely** the observed condition is an EPD.
- EPD diagnosis not yet confirmed by NVSL laboratory.
- **Actions:**
 - The Primary Decision Group will be immediately activated
 - Secondary Decision Group will provide support as requested by the Primary Decision Group



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Priority I (Confirmed Diagnosis)

- Based on a positive diagnosis of an EPD by NVSL
- **Actions:**
 - Quarantine Order will be issued on the infected premise
 - Quarantine Zone will be established



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Priority I (Confirmed Diagnosis)

- Activities of EPD Primary Decision Group
 - Initiate full implementation of the Washington Comprehensive Emergency Management Plan (CEMP)
 - Provide technical assistance to the WSDA Primary Decision Group



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Avian Influenza Surveillance - Overview

- Protect commercial poultry
- Cover multiple segments
 - Commercial
 - Live Bird Markets (e.g., saleyards, swap meets)
 - Backyard Poultry
- Find AI before it gets a chance to become established in the poultry population



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Avian Influenza Surveillance – Populations Tested

- Live bird auctions / saleyards
- County / community fairs and exhibits
- Swap meets / flea markets
- Farmers markets
- High-risk (sentinel) flocks
- National Poultry Improvement Plan
 - Commercial poultry
 - Backyard/exhibit flocks
 - Game bird farms
- Upland game bird (Department of Fish & Wildlife)
- Sick / dead bird reporting



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Avian Influenza Surveillance Testing

- Live bird auctions / saleyards
 - 2007: 6,344 samples tested
 - 2008-Present (9/15/08): 3,764 samples tested



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Avian Influenza Surveillance Testing

- Fairs / bird shows
 - 2007: 1,588 samples tested
 - 2008-Present (9/15/08): 728 samples tested



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Avian Influenza Surveillance Testing

- Farmers markets
 - 2007: 219 eggs tested
 - 2008-Present (9/15/08): 84 eggs tested



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Avian Influenza Surveillance Testing

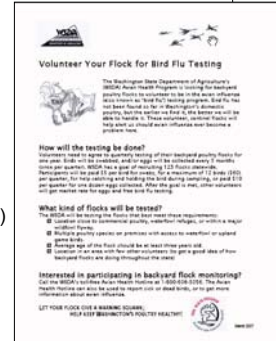
- High-risk (sentinel) flocks
 - 104 volunteer flocks as of 3-2008
 - 2007: 1,125 eggs / 1,777 swabs tested
 - 2008-Present (9/15/08): 771 eggs / 1,136 swabs tested



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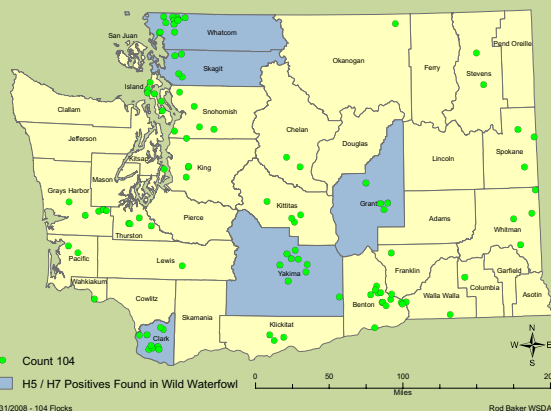
High Risk (Sentinel) Flocks

- Recruitment
 - WSDA Press Release
 - WSDA Field Staff
 - Selected Feed Stores
 - Extension & 4-H
- Flock Characteristics
 - Location (wetlands, near commercial poultry, flyway)
 - Multiple poultry species
 - Average age – 3 years old



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Location of Avian Influenza Sentinel Flocks



High Risk (Sentinel) Flocks

- Feedback from USDA – Angela Pelzel, DVM

“This kind of surveillance is exactly what we need out there to fill the gaps in our national surveillance program and Washington is really setting the bar. Thanks so much for all that you do and keep up the good work!”



22

National Poultry Improvement Plan (NPIP) Participation in WA State

- Federal program open to all poultry producers
- *NPIP participants must demonstrate that flocks, facilities, personnel, and management practices meet specific requirements invoked to reduce the development and spread of disease*



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National Poultry Improvement Plan (NPIP) Participation in WA State

- NPIP administered by ‘Official State Agencies’
 - Washington State: **WSDA**
- WA has a total of 45 NPIP participating flocks



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Avian Influenza Surveillance Testing

- NPIP: Commercial poultry producers (flocks >75,000)
 - 7 of 7 table-egg layers joined NPIP
 - 2 of 2 slaughter processing plants joined NPIP
- WSDA funds AI testing required for “H5 / H7 Monitored Status” for all commercial producers participating in NPIP



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Avian Influenza Surveillance Testing

- NPIP: Backyard / exhibit flocks
 - 24 Participating flocks in Washington State
 - Sept. 2007-Sept. 2008: 700 birds tested for AI
- WSDA funds AI testing required for “H5 / H7 Clean Status” for all backyard/exhibit producers participating in NPIP



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Avian Influenza Surveillance Testing

- NPIP: Game bird farms
 - 14 Participating flocks in Washington State
 - Sept. 2007-Sept. 2008: 500 birds tested for AI
- WSDA funds AI testing required for “H5 / H7 Clean Status”



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Upland Game Birds

- In addition to NPIP: WSDA works with Washington Department of Fish and Wildlife – AI testing requirements (WAC 232-12-027)

“During June, July, or August, a licensed game farm must conduct annual avian influenza disease testing of ten percent or a maximum of thirty representative game birds on-site.”
- WSDA currently pays for required AI testing



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Upland Game Birds

- 69 game bird producers in WA State
- 14 (20%) are NPIP participants
- WSDA encourages participation in NPIP



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Sick Bird Reporting

- WSDA established a toll-free phone number to report sick / dead birds
- 1-800-606-3056**



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Questions?



Julie Broome: Avian Health Program Coordinator
Phone: 360.725.5762 or Email: JBroome@agr.wa.gov

Lora Davis, DVM, MPH: Field Veterinarian
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WSDA Website:
<http://agr.wa.gov/FoodAnimal/AnimalHealth/default.htm>



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May 2006

Valoria H. Loveland

Director
WSDA

Contact:

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Washington State Veterinarian
(360) 902-1881

Avian Influenza Surveillance and Response

Avian Influenza (AI), sometimes known as bird flu, is a viral disease that can affect most species of domestic poultry, as well as migratory wildfowl and shore birds. There are many different varieties of AI that frequently occur in Washington and around the world. The vast majority of these AI viruses are naturally occurring and low pathogenic (do not kill most infected birds) and do not impact human health.

Highly Pathogenic Avian Influenza (HPAI) is of greater concern to veterinarians and commercial poultry operations because of the large numbers of infected birds that can die from an outbreak of the disease. These diseases are highly contagious among birds and must be quickly contained to keep them from infecting other commercial or backyard flocks. To date, no HPAI has been detected in Washington. The human health impact of HPAI is minimal.

Global public health officials, however, are concerned about a strain of HPAI known as Asian H5N1. This strain has been shown to sicken and kill humans who contract the disease by living in close proximity to poultry or coming into contact with diseased birds. Fortunately, the current avian influenza viruses lack the ability to easily spread from person-to-person. The concern is that the virus could mutate to allow easy human-to-human transmission, precipitating a pandemic of Asian H5N1 in humans. It is important to note that this kind of quick human-to-human transmission of this particular virus has not yet occurred anywhere in the world and, in fact, may never happen.

The Washington State Department of Agriculture (WSDA) continues to work with state and federal partners to monitor the movement of this Asian HPAI H5N1 virus in domestic poultry and wild waterfowl. It has not yet been identified in North American bird populations, but Asian HPAI H5N1 could reach the U.S. a number of ways, including smuggled birds or bird products or by migrating wildfowl. *If this should occur, there are no immediate consequences for public health.*

To protect the health of the state's poultry flocks from all types of AI viruses, WSDA has established a surveillance and testing program in the state. Working with the major commercial poultry producers, backyard poultry owners and exhibitors, WSDA veterinary experts and food safety officials have developed an AI testing program and outbreak response plan. The Washington plan is patterned after national standards adopted by other poultry-producing states.

Did you know?

- Most avian influenza viruses are not a threat to human health
- Highly Pathogenic Avian Influenza has never been detected in Washington
- Only humans in very close contact with diseased birds have been infected with avian influenza
- Quick human-to-human transmission of Asian H5N1 has not yet occurred and may never happen
- WSDA and partner agencies are closely monitoring the movement of H5N1 in domestic poultry and wild waterfowl around the world
- Normal cooking kills all avian influenza viruses
- No diseased birds will be allowed to enter the food supply under the WSDA response plan

(over)

What is being done to reduce the risk?

- WSDA and its stakeholders have developed an AI testing program and outbreak response plan
- Bird owners are being encouraged to prevent the mingling of domestic poultry with wild birds
- Bird owners should report signs of unusual illness among birds
- The WSU Puyallup lab tests sick and dead birds free of charge to ensure that HPAI is not present in Washington
- WSDA is testing eggs sold at Farmers Markets for AI antibodies
- WSDA conducts exercises with other agencies to improve response coordination between agencies
- USDA and WSDA are expanding outreach efforts to backyard bird owners and small-scale poultry processors
- The Washington Legislature and USDA are supporting WSDA's outreach with additional funding

Like all microorganisms, avian influenza viruses are killed through normal cooking practices. As an added protection to the consumer, no diseased birds would be allowed to enter the food supply under the current WSDA response plan.

Dr. Leonard Eldridge, Washington's state veterinarian, encourages bird owners to practice good biosecurity by preventing the mingling of domestic poultry with wild birds and minimizing contact between bird flocks. Also, bird owners are encouraged to report signs of unusual illness among birds, such as sneezing, coughing, nasal discharge, diarrhea, listlessness and sudden death. Bird owners can report disease to the state veterinarian's office, the U.S. Department of Agriculture or their local veterinarian.

In cooperation with the WSDA surveillance effort, the Washington State University Avian Health and Food Safety Lab in Puyallup conducts testing of sick and dead birds to ensure that HPAI is not present in Washington's bird population. The program is free to the poultry producer or backyard bird owner. Large commercial operations are currently developing their own national testing program, and WSDA is receiving some of this testing data on a cooperative basis.

Through a cooperative agreement with the U.S. Department of Agriculture, WSDA staff has purchased eggs at Farmers Markets for testing for avian influenza antibodies. The presence of these antibodies can signal exposure of laying chickens to AI viruses. However, these antibodies pose no risk of infection to humans. The testing of eggs also occurs at the WSU Avian Health and Food Safety Lab in Puyallup.

WSDA continues to refine its response training to prepare for the possibility of a HPAI outbreak in Washington. In November 2005, WSDA sponsored an avian influenza exercise in Blaine, Washington. Participants included representatives from local, state, federal and tribal governments and Canadian animal health officials. The purpose of the event was to improve coordination between WSDA, our federal partners, state agencies, and local jurisdictions, and improve our working relationship with our counterparts in British Columbia.

In cooperation with the U.S. Department of Agriculture and other partners, WSDA is expanding its outreach efforts to backyard bird owners and small-scale poultry processors. WSDA employees have attended state and county fairs to promote biosecurity practices and encourage participation in the state's surveillance efforts. The Washington Legislature and the U.S. Department of Agriculture have recently approved additional funding for this effort.

Disinfectants

Cleaning and disinfecting is one of the most important steps you can take in practicing backyard biosecurity. Below are some examples of disinfectants available on the market. Follow the directions on the label carefully for the best results.

- Thoroughly clean and scrub objects before applying disinfectants. Disinfectants cannot work on top of caked-on dirt and manure, so thoroughly wash surfaces before disinfecting.
- Apply disinfectants using brushes, sponges and spray units. Allow adequate contact time (follow manufacturer's instructions.)
- Dispose of used disinfectant according to local regulations.

Examples of Disinfectants

- Roccal®: Mix 1/2 fluid oz of Roccal per gallon of water.
- Nolvasan® (chlorhexidine diacetate 2 percent): Mix 3 fluid oz of Nolvasan per gallon of water.
- Household bleach (sodium hypochlorite 6 percent): Mix 3/4 cup of household bleach per gallon of water.
- Lysol® spray for footwear
- Purell® hand pump for hand disinfection

Note: Trade names used in this publication do not constitute an endorsement, guarantee, or warranty of these products. USDA bears no responsibility resulting from the use of the described products. These procedures are not guaranteed to prevent highly contagious diseases from affecting your birds; however, they will reduce the risks.

Why Be Concerned?

- Not only could an outbreak of a bird disease such as exotic Newcastle disease or highly pathogenic avian influenza harm or kill your birds, it could spread quickly and kill other nearby birds.
- Early detection and reporting is the most important step in eradicating a disease outbreak. Don't be afraid of "crying wolf." State and Federal veterinarians want to hear about sick and dying birds.
- There is no charge for USDA veterinarians to work with you to conduct a disease investigation.



www.aphis.usda.gov/vs



LOOK for Signs.

Watch for signs of disease or unexpected deaths among your birds.



REPORT Sick Birds.

Don't wait—early detection and reporting can make a difference. If your birds are sick or dying, call the USDA Veterinary Services office at **1-866-536-7593** or your State Veterinarian or local cooperative extension office to find out why.



PRACTICE Backyard Biosecurity.

Restrict traffic onto and off your property. Disinfect shoes, clothes, and hands to prevent the potential spread of disease. You are the best protection your birds have.



United States Department of Agriculture
Animal and Plant Health Inspection Service
Program Aid No. 1765

Backyard Biosecurity Practices To Keep Your Birds Healthy



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Issued May 2004

Backyard biosecurity means doing everything you can to protect your birds from disease. As a bird owner, keeping your birds healthy is a top priority. Your birds can become sick or die from exposure to just a few unseen bacteria, viruses, or parasites. In a single day, these germs can multiply and infect all your birds. However, by practicing backyard biosecurity, you can keep your birds healthy.

If you follow these basic tips and make them part of your routine, you decrease the risk of disease entering your flock and persisting in soil, droppings, and debris. Practicing biosecurity is an investment in the health of your birds.

Biosecurity Tips: 6 Ways To Prevent Poultry Disease

1 Keep Your Distance.

Restrict access to your property and your birds. Consider fencing off the area where your birds are to form a barrier between “clean” and “dirty” areas. The clean area is the immediate area surrounding your birds, and the dirty or buffer area must be considered to be infected with germs, even if the birds appear healthy and disease free.

Allow only people who take care of your birds to come into contact with them. Your caretakers should not attend bird shows or other events where birds are present. If visitors to your property want to see your birds, be sure they wash up first and clean their shoes. Better yet, keep clean boots for visitors to wear. If your visitors have birds of their own, **do not** let them near your birds at all.

Game birds and migratory waterfowl should not have contact with your flock because they can carry germs and diseases. If your birds are outdoors, try to keep them in a screened area.



2 Keep It Clean.

You wouldn't think of tracking dirt and disease into your house, where it could infect your family. Don't do that to your birds either! Germs can be picked up on shoes and clothing and moved from one area to another. To keep your birds “germ-free,” keep a pair of shoes and a set of clothes to wear only around your birds. Many people keep these clean clothes in a covered pail at the entrance to their bird area. Or, clean and disinfect your shoes and launder your clothes before you check on or work with your birds.

Scrubbing your shoes with a long-handled scrub brush and disinfectant (see section on disinfectants) will remove droppings, mud, or debris. Clothes should be washed in a washing machine with laundry detergent.

Wash your hands thoroughly with soap, water, and a disinfectant before entering your bird area.

Keep cages, food, and water clean on a daily basis. Clean and disinfect equipment that comes in contact with your birds or their droppings. That includes tools such as feed scoops, shovels, rakes, and brooms. All manure must be removed before disinfectant can work, so clean surfaces with soap and water first. Properly dispose of dead birds by burial or incineration or take them to a landfill. Check on local ordinances for acceptable disposal methods.

3 Don't Haul Disease Home.

Car and truck tires, poultry cages, and equipment can all harbor “germs.” If you travel to a location where other birds are present, or even to the feed store, be sure to clean and disinfect these items before you return to your property.

Taking some of your birds to a fair or exhibition? Keep those birds separated from the rest of your flock and watch them for at least 2 weeks after the event to ensure that they didn't pick up a disease.

New birds should be kept separate from your flock for at least 30 days before putting them with the rest of your birds. To prevent disease, it is best not to mix young and old birds or birds from different species or different sources.

4 Don't Borrow Disease From Your Neighbor.

Do not share birds, lawn and garden equipment, tools, or poultry supplies with your neighbors or other bird owners. If you do bring these items home, clean and disinfect them before they reach your property. And remember to clean and disinfect borrowed items before returning them. Never share items such as wooden pallets or cardboard egg cartons because they are porous and cannot be adequately cleaned and disinfected.



5 Know the Warning Signs of Infectious Bird Diseases.

Many bird diseases can be difficult to diagnose. The list below includes some of the things to look for that signal something might be wrong with your birds. Early detection of signs is very important to prevent the spread of disease.

- Sudden increase in bird deaths in your flock
- Sneezing, gasping for air, coughing, and nasal discharge
- Watery and green diarrhea
- Lack of energy and poor appetite
- Drop in egg production or soft- or thin-shelled misshapen eggs
- Swelling around the eyes, neck, and head
- Purple discoloration of the wattles, combs, and legs (AI)
- Tremors, drooping wings, circling, twisting of the head and neck, or lack of movement (END)

6 Report Sick Birds.

Do not wait to report unusual signs of disease or unexpected deaths among your birds. Call your agricultural extension agent, local veterinarian, the State Veterinarian, or U.S. Department of Agriculture (USDA) Veterinary Services office. USDA operates a toll-free hotline (**1-866-536-7593**) with veterinarians to help you. USDA wants to test sick birds to make sure they do not have a serious poultry disease. There is no charge for USDA veterinarians to work with you to conduct a disease investigation. Early reporting is important to protecting the health of your birds!



West Nile Virus

❑ WHAT IS IT?

West Nile virus (WNV) causes West Nile fever and West Nile meningitis, encephalitis and West Nile poliomyelitis. It can infect people, birds, mosquitoes, horses and other animals. In Washington State the virus was first found in horses and birds in 2002. The first human infection by WNV in Washington State occurred in 2006.

❑ SYMPTOMS

Most people who are infected with the West Nile virus will not get sick. In those who do become ill, symptoms usually begin between 3 and 14 days after being bitten by an infected mosquito.

About 1 in 5 infected persons will develop West Nile fever, a flu-like illness lasting a few days to several weeks. In addition to fever, symptoms include:

- ✓ Fatigue
- ✓ Headache
- ✓ Loss of appetite
- ✓ Muscle aches
- ✓ Nausea
- ✓ Rash
- ✓ Vomiting
- ✓ Swollen glands

About 1 in 150 infected people will have one of the more severe and potentially fatal forms of disease (West Nile meningitis, encephalitis or West Nile poliomyelitis) that can include symptoms of West Nile fever and:

- ✓ Severe headache
- ✓ Neck stiffness
- ✓ Decreased level of alertness
- ✓ Muscle weakness, tremors, or paralysis
- ✓ Sensitivity to light
- ✓ Convulsions or coma

❑ HOW IS IT SPREAD?

West Nile virus is spread to people mainly by the bite of an infected mosquito. Mosquitoes become infected after feeding on birds that carry the virus. WNV is not spread by direct contact with infected animals or people, but care should always be used when handling sick or dead animals. WNV may be spread via blood transfusion and organ transplantation. Blood and organ donations are routinely tested and infected donations are not used.

❑ WHO IS AT RISK?

The risk of getting West Nile virus is very low, but anyone who is bitten by infected mosquitoes can be infected. Older people over 50 years of age have a higher risk of having more serious symptoms.

❑ DIAGNOSIS AND TREATMENT

- ✓ West Nile virus in humans is diagnosed by testing blood and/or CSF (cerebrospinal fluid from a spinal tap).
- ✓ Contact your healthcare professional if you have symptoms of a possible WNV infection, especially if you recently had mosquito bites.
- ✓ There is no vaccine for humans or specific treatment other than supportive care.

❑ PREVENTION

- ✓ Empty anything outdoors that holds standing water—any standing water can serve as a mosquito breeding site.
- ✓ Change water in birdbaths, fountains, wading pools and animal troughs weekly.
- ✓ Make sure that roof gutters drain properly.
- ✓ Fix leaky outdoor faucets and sprinklers.
- ✓ Make sure that windows and door screens are “bug tight”—if not, repair or replace them.
- ✓ Stay indoors at dawn and dusk when mosquitoes are the most active.
- ✓ Wear protective clothing (long sleeves, long pants and a hat) when going into mosquito-infested areas.
- ✓ Use mosquito repellent when necessary, and carefully follow the directions on the label. Effective repellents contain DEET, picaridin, or oil of lemon eucalyptus.
- ✓ Assist elderly neighbors and relatives in these tasks to help keep them safe from mosquito bites.

❑ WHAT SHOULD I DO IF I FIND A DEAD BIRD?

West Nile virus infects many wild birds including crows, jays and ravens. Increasing numbers of dead birds can be a sign that WNV is present in a community. As with any dead animal, avoid any direct contact. Wear gloves or use a shovel to move the bird. Dead birds can be disposed of by putting them in a plastic bag and then into the garbage.

Public Health tracks and sometimes tests dead birds. You can help by reporting dead birds to Public Health at (206) 205-4394, or on the web at:

www.metrokc.gov/health/westnile/deadbird.htm

**Report all King County cases to
Public Health by calling (206) 296-4774.**

Available in alternate formats.