Avian Chlamydiosis
(Psittacosis, Ornithosis)

Agent: Avian Chlamydiosis is caused by the gram-negative, obligate intracellular bacterium, *Chlamydophila psittaci* (formerly known as *Chlamydia psittaci*). Six serovars have been isolated from birds, corresponding to the avian species with which they are associated. *C. psittaci* is found worldwide inclusive of Georgia in a wide variety of avian species. It is particularly common in tropical and subtropical regions.

Brief Description: The clinical signs of *C. psittaci* in birds vary greatly, dependent upon the age and species of bird, with young birds tending to be more susceptible. Avian Chlamydiosis can cause decreased egg production, ruffled feathers, depression, anorexia and weight loss, dehydration, diarrhea, yellow or greenish droppings, sinusitis, conjunctivitis, polyuria, nasal discharge, sneezing, lacrimation, and respiratory distress. Asymptomatic infection with intermittent shedding is common. Neurological signs have been observed in some species including turkeys and ducks. Virulence varies between strains. Stress or concurrent infection increases the severity of the disease.

Differential Diagnosis: The signs of chlamydiosis in birds are non-specific and resemble those observed in many other diseases. The diagnosis of chlamydiosis must be considered in any sick bird with compatible symptoms, especially in newly acquired birds. The differential diagnosis includes:

- Avian Influenza
- Aspergillosis
- Fowl Cholera
- *Mycoplasma gallisepticum* infections
- Herpesviruses
- Paramyxoviruses
- Enterobacteriaceae
- Other viral and bacterial infections

Reservoir/Host Species: Many species of birds can be infected with *C. psittaci* including domestic and free-ranging birds. Psittacine birds, especially cockatiels, parrots, parakeets and macaws, are frequently infected with *C. psittaci*. Among poultry species, ducks and turkeys are more susceptible to infection than chickens. Pigeons, doves, mynah birds, ratites, raptors, and shore birds may also harbor the organism.

Mode of Transmission: Infected birds shed *C. psittaci* in their feces and nasal secretions. The organism is resistant to drying and may remain infectious for several months in dried materials. Inhalation of aerosolized organisms is the primary route of infection. Ingestion of particles can cause infection and fomites may spread the organism. Asymptomatic carriers can shed the organism intermittently in their feces, especially when stressed by shipping, crowding, chilling, relocation, or breeding. Mouth-to-beak contact and handling infected bird's plumage and tissues may result in exposure.

Incubation Period: Three days to several weeks, with latent infections potentially causing clinical signs years after infection.

Diagnosis: Chlamydiosis should be considered in any lethargic and generally ill bird, especially in a newly acquired bird. Definitive diagnosis is made by isolating *C. psittaci* from diseased animals. The organism can be shed intermittently by carriers and a single negative culture does not rule-out the disease. Treatment with antibiotics during the weeks before testing may also lead to false negatives. The organism can also be identified by direct immunofluorescence or impression smears of affected tissues

stained by Giemsa, Gimenez, or Macchiavello's methods. Cloacal, choanal, oropharyngeal, conjunctival, or fecal swabs from live birds or tissues (i.e., liver, spleen, serosal membranes) from dead birds should be submitted. Histochemical or immunohistochemical staining, as well as PCR and ELISA assays are used to identify the organism in tissues, feces, or exudates. Serology is also useful in diagnosis of the disease and a four-fold or greater rise in titer should be seen in paired serum taken at least 2 weeks apart. Complement fixation is the standard serologic test. Other serologic assays include ELISA, latex agglutination, elementary body agglutination, micro-immunofluorescence, and agar gel immunodiffusion. The elementary body agglutination test detects IgM antibodies and is used to diagnose current infection.

Testing in the State of Georgia is performed at the University of Georgia's College of Veterinary Medicine's Infectious Disease Laboratory http://www.vet.uga.edu/sams/idl and at the University of Georgia's Veterinary Diagnostic Laboratories in Athens http://www.vet.uga.edu/dlab/athens/index.php and Tifton http://www.vet.uga.edu/dlab/tifton/index.php. Samples sent to the Athens Veterinary Diagnostic Laboratory are transferred to the Infectious Disease Laboratory when appropriate. Polymerase Chain Reaction (PCR) is used to test conjunctival swabs, choanal swabs, cloacal swabs, serum, and whole blood. The Infectious Disease Laboratory's preferred submission requirements for PCR is utilizing a Becton Dickinson culturette to swab conjunctiva, choana, and cloaca. The same swab can be used for these sites provided they are taken in the order listed. The culturette should be placed back in its plastic sheath prior to shipping, and the ampoule may or may not be activated. If the swab is put into another transport container such as a red top tube, then a 2-3 inch handle must be left on the swab. The culturette must not contain a gel transport media. A PCR antigen test can be run with 0.1 ml of serum, or plasma with heparin or EDTA. The Indirect Fluorescent Antibody (IFA) test is run with 0.1 ml of serum or heparinized plasma. IFA test samples may be sent directly to the Comparative Pathology Laboratory, Avian and Wildlife Laboratory in Miami, Florida or will be transferred if sent to the Athens Infectious Disease Laboratory. For all blood tests, the serum or plasma must be spun down, and the clear plasma or serum transferred to a new sterile blood tube double sealed with parafilm. Samples should be kept cool and shipped with ice packs overnight to the laboratory to arrive Monday through Friday only. The Athen's Diagnostic Laboratory also tests by PCR utilizing a sterile swab for conjunctiva, choana, and cloaca swabs and prefers a swab moistened with 0.5 – 1.0 ml of saline and sent in a sterile serum tube. PCR tests at both laboratories are performed most days, Monday through Friday, and results are typically reported within 24-48 hours. All the Georgia laboratories listed accept tissues in capped sterile tubes without media for Direct Fluorescent Antibody testing on liver, spleen, or serosal membrane samples. Results are usually available the same day as arrival at the laboratory. Before submitting birds for necropsy or preparing tissue samples, wet the bird thoroughly with a detergent solution to cool the bird and decrease the risk of exposure to aerosolized material. Requiring at least one week for processing, the UGA Tifton Veterinary Diagnostic Laboratory cultures cloacal swabs collected with bacterial culturettes (not charcoal). For more information on testing and sample collection, please contact the Avian and Exotics Division of the Infectious Diseases Lab (706) 542-8092, The UGA Athens Veterinary Diagnostic Laboratory (706) 542-5568, The UGA Tifton Veterinary Diagnostic Laboratory (229) 386-3340, or the University of Miami, College of Medicine Comparative Pathology Lab (800) 596-7390. Be sure to appropriately label, seal, and double bag all samples due to the zoonotic potential of the samples.

Period of Communicability: This is variable since the organism is excreted in the feces and nasal discharges of symptomatic and asymptomatic birds.

Prevention Measures/Control: Transmission of the disease between birds is prevented by a combination of measures. All infected birds should be quarantined while undergoing treatment. Before cleaning the area where infected birds are/were located, first spray a fine mist of water all over surfaces to decrease aerosolizing fecal matter. It should then be thoroughly cleaned with a detergent to remove all fecal material, rinsed, disinfected with an appropriate agent with 5-10 minutes of contact time, and then rerinsed to remove the disinfectant. Items that can't be thoroughly disinfected such as litter, wooden

perches, and nesting material should be double bagged and thrown away. Effective disinfectants include a dilute (1:1,000) quaternary ammonium compound (e.g., Roccal or Zephiran), 1% Lysol, or 1:32 bleach solution (i.e., ½ cup bleach/ gallon of water). Many disinfectants are respiratory irritants and should be used in a well ventilated area following all label directions. Since this disease can be spread to humans, exposure to feathers and dust should be minimized, and those handling the birds or cleaning cages should wear appropriate protective clothing including gloves, surgical cap, and a respirator with at least a N95 rating (personnel must be fit tested i.e. a medical examination to determine that they are fit for service under the conditions and for the organism, otherwise they are not compliant). Do not use a vacuum to clean dried fecal material. Deceased birds should be soaked in detergent solution and remain wet during necropsy. During necropsy, birds should be examined with appropriate protective clothing and PPE (this again requires, mask, goggles, face shield and the appropriate gown and double gloves taped) or under a biosafety cabinet.

Newly acquired pet birds should be isolated from other birds if showing any clinical signs. Although antibiotics can be effective in treating symptoms, infection is not always cleared. Usually, a forty five day treatment regimen is required of Georgia's quarantined birds with chlamydiosis. Other treatment regimens must be approved in writing by the offices of the State Veterinarian. The National Association of State Public Health Veterinarians' Compendium of Measures to Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis) is a good source for treatment recommendations. http://www.nasphv.org/Documents/Psittacosis.pdf Be certain to follow the dietary calcium recommendations during treatment.

Vaccine: There is currently no vaccine for *C. psittaci*.

Zoonotic Risk: Birds infected with *Chlamydophila psittaci* pose a significant risk for zoonotic infection. Human infections usually occur by inhalation. The term "Parrot fever" is used to distinguish disease caused by *C. psittaci* from infections caused by other species of *Chlamydophila* (*C. abortus, C. felis,* and *C. pneumoniae*) and from the human venereal disease caused by *Chlamydia trachomatis*.

Psittacosis in humans is a reportable disease in Georgia. Five cases of human infection with Psittacosis were reported in Georgia in 1995; however, no other human cases have been recorded as of December 2007. There are typically 3-5 cases of *C. psittaci* reported in birds annually in Georgia. The CDC reports 146 cases of Psittacosis in humans from 1996 - 2004; however, this likely reflects underreporting of the actual number of cases. Risk factors for infection include exposure to pet birds and poultry. Occupational exposure is a risk for veterinarians, pet shop employees, zoo workers, and poultry processing workers. Clinical signs in humans vary from inapparent to severe pneumonia and may cause death if untreated. Flu-like symptoms inclusive of fever, chills, headache, muscle aches, and lethargy have been reported. Usually an unproductive cough and breathing difficulty, or chest tightness is reported. People who experience symptoms of the disease and who have been exposed to birds, even apparently healthy birds, or their droppings should discuss these exposures with their healthcare provider.

Potential as Biothreat: Psittacosis is a potential bioterrorism agent and has previously been part of bioweapons research programs. Person to person transmission is rare although it occasionally spreads during paroxysmal coughing. Treated cases are rarely fatal. In severe cases, untreated infections may result in a mortality rate of 10-40%.

Reporting Requirements:

- **Any person who makes a laboratory confirmation of *Chlamydophilia psittaci* in an animal shall report it by the close of the next business day**, to the State Veterinarian's office at (404) 656-3667 or (404) 656-3671 in Atlanta, or 800-282-5852 outside of Atlanta, or to the USDA

Area Veterinarian in Charge at (770) 922-7860. The veterinarian in charge of the confirmed case must report to the State Veterinarian's office, regardless of whether or not the diagnostic laboratory also reports it.

- **Laboratory confirmation of Psittacosis in humans is reportable within seven days to the Georgia Division of Public Health, Notifiable Disease Section**. For more information, or to contact the Georgia Division of Public Health, call (404)-657-2588 or go to http://health.state.ga.us/epi/disease/index.asp

Electronic References:

Centers for Disease Control and Prevention (CDC). Disease Information – Psittacosis.
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/psittacosis_t.htm

Georgia Division of Public Health. Psittacosis FAQs for Bird Owners and Caretakers, 2008.
http://health.state.ga.us/pdfs/epi/zvbd/psittacosis_bird_owners_final.pdf

Georgia Division of Public Health. Psittacosis Fact Sheet.
http://www.health.state.ga.us/pdfs/epi/notifiable/psittacosis.fs.02.pdf

Georgia Division of Public Health. Psittacosis Q & A.
http://health.state.ga.us/pdfs/epi/notifiable/psittacosis.qa.02.pdf

Georgia Division of Public Health. Surveillance Projects Zoonotic Diseases Web-page.
http://health.state.ga.us/epi/zvbd/zoonotic/index.asp

The International Parrotlet Society.
http://www.internationalparrotletsociety.org/psittacosis.html

The Merck Veterinary Manuel, 50th Anniversary edition.
http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/201700.htm&word=psittacosis

National Association of State Public Health Veterinarians, Inc. Compendium of Measures to Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2006.
http://www.nasphv.org/Documents/Psittacosis.pdf

Office International des Epizooties (OIE) – Manual of Standards for Diagnostic Tests and Vaccines.
http://www.oie.int/fr/normes/mmanual/a_00105.htm

Institute for International Cooperation in Animal Biologics. An OIE Collaborating Center Iowa State University College of Veterinary Medicine.
http://www.cfsph.iastate.edu/Factsheets/pdfs/chlamydiosis_avian.pdf

Other References:

Smith KA, Bradley KK, Stobierski MG, Tengelsen LA; National Association of State Public Health Veterinarians Psittacosis Compendium Committee. Compendium of measures to control *Chlamydophila psittaci* (formerly *Chlamydia psittaci*) infection among humans (psittacosis) and pet birds, 2005.

Journal of the American Veterinary Medical Association. 2005; 226: 532-539.
Spickler, AR and Roth, JA, eds. *Emerging and Exotic Diseases of Animals.* Iowa State University, Ames, Iowa: 2003.