

The Application and Benefits of Molecular (PCR) Testing of Some Common Avian Pathogens

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The ability to amplify very small amounts of genetic material many millions of times through processes such as the polymerase chain reaction (PCR) has been used to identify avian pathogens. In the past, if it was possible to culture the pathogen, one would have needed to collect a sample and transport it under ideal conditions to a laboratory for culture. Alternately direct or indirect serology-based methods would look for antibodies to the pathogen. Other methods such as electron microscopy have also been used but the advent of molecular diagnostic methods overcomes the limitations of the other methods and is now proving to be superior and the diagnostic method of choice. It is now possible to send a small blood sample on a piece of paper or a dried faecal or respiratory swab to the laboratory for testing at room temperature. This presentation will discuss the application of molecular testing of three common avian pathogens viz, Psittacine Beak and Feather disease virus (PBFDV), *Chlamydomphila psittaci* (CP) and Avian Polyoma Virus (APV).

PSITTACINE BEAK AND FEATHER DISEASE

Psittacine Beak and Feather (PBFDV) is a highly infectious circovirus that causes Psittacine Beak and Feather Disease. Progressive feather loss and malformed feathers are features of the disease but similar symptoms may be caused by other pathogens or factors so testing is required to confirm a diagnosis. Furthermore, some birds may be infected yet show no symptoms. A routine method to culture the virus is not available for PBFDV and indirect methods such as serology tests would not necessarily confirm the presence of the virus.

Molecular methods have been developed that are sensitive and specific and proving to be the most effective way to identify PBFDV. The PCR test is one of a growing number of molecular (nucleic acid based amplification) methods that can detect viral genetic material in a dried blood spot that has been diluted many thousands of times. The ability to test a dried blood spot or swab means that samples can be submitted at room temperature to the laboratory for testing.

PBFDV is an extremely stable virus and infectious virus can survive in feather dust and on surfaces for months and only reveal itself when chicks in the environment start to present with characteristic symptoms of PBFDV. It is also possible to send surface swabs for testing for the presence of the virus and monitor cleanliness.

The use of this test in the diagnosis and management of PBFDV will be expanded upon.

AVIAN POLYOMAVIRUS

The Avian Polyomavirus (APV) was first recognised in the early 1980s in Budgerigars in the USA and

Canada. Subsequently, the virus was found to infect many different species of parrots. Death due to APV is generally confined to nestlings between 10–25 days of age. At death, birds are found to have abnormal feather development, skin discolouration, and scattered areas of bleeding as a few of the symptoms. In some outbreaks, birds will show head tumours. Not every bird infected with APV will die and some infected birds will never become ill and may show no sign of infection.

Sensitive molecular tests have been developed to identify APV. As with PBFVDV, a dried blood spot can be submitted at room temperature for PCR testing. The virus can also be shed in the feces so a fecal swab can also be submitted for testing. The molecular test is a direct and sensitive and is able to detect birds that are asymptomatic carriers of the virus.

CHLAMYDOPHILA PSITTACI (CP)

Another important avian disease is chlamydiosis that is caused by *Chlamydophila psittaci* (CP) - this pathogen can also infect humans and a variety of animals. Infected individuals may be symptomatic or asymptomatic. The disease becomes a systemic illness, often with respiratory complications and conjunctivitis. Asymptomatic carriers may shed the bacteria under stressful conditions, eg breeding or transportation, and thus becoming a source of infection.

In some cases CP can linger in a bird for a long time and be responsible for its poor condition. The molecular test can detect the organism in the blood. However, there are times when more organisms are found in respiratory and faecal samples, especially in the early stages of the infection. As with APV, if possible, it is desirable to submit both a blood and a faecal sample. CP can also cause a respiratory disease in humans so it is important to test ones birds for CP and ensure that any new additions to the aviary are free of the pathogen.

SUMMARY

Molecular tests can be developed to test for any known organism be it a virus, bacteria or parasite from any body fluid or tissue should it be present. It is also possible to test for multiple pathogens from one sample and even at the same time. In this presentation we discuss the value of molecular testing to identify and manage three common avian pathogens. Problems that can be encountered in the laboratory and by the submitter are also discussed.

Table 1. Summary chart showing the sample type that can be submitted to the laboratory for the molecular testing of PBFVDV, APV and CP.

Pathogen	Sample type		
	*MDS collection kit	Faecal swab	Respiratory swab
DNA sexing	Yes		
PBFVDV	Yes		
CP	Yes	Yes	Yes
APV	Yes	Yes	

*The MDS collection kit is a simple self-collection containing a special paper to collect a small drop of blood.