

## Virology & Molecular Diagnostics – List of Tests and Preferred Specimens

The following tables show the recommended specimen(s) and procedures used for pathogen detection or serological analysis in the Virology, Molecular Diagnostics and Serology sections of the Animal Health Centre. If you are unsure of the suitability of a specimen for a particular disease or pathogen, please contact the Animal Health Centre Laboratory at 604-556-3003.

Follow the guidelines for [Submission of Specimens for Virology](#) and [Molecular Diagnostics](#) for proper collection and submission of specimens.

ABBREVIATIONS:	
AGID	Agar Gel Immunodiffusion
ELISA	Enzyme Linked Immunosorbent Assay
EM	Electron Microscopy
FA	Fluorescent Antibody
HA	Hemagglutination
HI	Hemagglutination Inhibition
IFA	Indirect Fluorescent Antibody
PCR	Polymerase Chain Reaction
VI	Virus Isolation
VN	Virus Neutralization

AVIAN			
Disease/Pathogen	Specimen	Virology/Molecular Diagnostics Methods	Serology [Volume of serum needed = 0.5ml/bird]
Avian Adenovirus (Inclusion Body Hepatitis, Hemorrhagic Enteritis)	Liver, spleen	PCR, VI, EM	AGID (Adenovirus-group-1) ELISA (HEV)
Avian Astrovirus (Chicken astrovirus)	Kidney, liver, proventriculus, intestine/cecum	PCR	
Avian Encephalomyelitis virus (AE)	Brain, pancreas, gizzard	PCR, VI, EM	ELISA
Avian Infectious Bronchitis virus (IBV)	Trachea/bronchus, tracheal swab, lungs, kidney, fecal swab, cecal tonsil	PCR, VI, EM	ELISA
Avian Infectious Laryngotracheitis virus (ILT)	Trachea, tracheal swab, lungs, eyelid	PCR, VI, EM	ELISA
Avian Influenza (AI) virus	Oropharyngeal swab, cloacal swab, trachea, spleen, lungs, kidney, brain, cecal tonsil	PCR, VI, EM	ELISA, AGID

Avian Nephritis virus	Kidney	PCR	
Avian Paramyxovirus (APMV)- 1 (Newcastle Disease)	Trachea, Oropharyngeal swab, lungs, brain, proventriculus, cecal tonsil, cloacal swab, spleen, kidney	PCR, VI, EM	ELISA
Avian Pneumovirus	Trachea, lung	PCR	
Avian Polyoma virus	Feather pulp, skin, lung, liver, kidney	PCR, EM	
Avian Reovirus (Enteric and Respiratory)	Intestine, pancreas, feces, trachea, lung	PCR, VI, EM	ELISA
Avian Reovirus (Viral arthritis)	Joint swab, tendons, heart (chicks)	PCR, VI, EM	ELISA
Chicken Anemia virus	Bursa, thymus, bone marrow, feces	PCR	ELISA
Duck Viral Enteritis	Liver, spleen, intestine, cecal tonsil	PCR, VI	
Fowl Pox virus	Skin lesions	PCR, EM, VI	
Infectious Bursal Disease virus	Bursa	PCR, VI	ELISA
Pigeon Circovirus	Feces, bursa	PCR	
Proventricular Dilatation Disease (avian bornavirus)	Crop, proventriculus, brain	PCR	
Psittacine Beak & Feather virus	Feather pulp, skin, bursa, thymus, feces, whole blood	PCR	
Psittacine Herpes virus (Pacheco's Disease)	Lung, liver, spleen	PCR, VI	
Reticuloendotheliosis virus	Buffy coat (whole blood), tumor tissues, spleen	PCR	
Turkey Coronavirus	Feces, intestine, bursa	PCR	
West Nile Virus	Brain, cloacal swab, choanal swab, liver, kidney, spleen	PCR	
<i>Avibacterium paragallinarum</i> (infectious coryza)	Trachea, lungs, tracheal swabs, sinus, eyelid	PCR	
<i>Bordetella avium</i>	Tracheal swab, trachea	PCR	ELISA
<i>Chlamydia psittaci</i>	Lung, liver, spleen, feces	PCR	
<i>Clostridium colinum</i>	Feces, intestine	PCR	
<i>Clostridium piliforme</i> (Tyzzer's)	Intestine	PCR	
<i>Erysipelotrix rhusiopathiae</i>	Joint swab, liver, spleen, heart, lungs	PCR	
<i>Mycoplasma gallisepticum, synoviae, meleagridis, iowae</i>	Tracheal swab, sinus, lung, air sac, joint swab, fertile eggs, tendons	PCR	ELISA, HI (no serology test for <i>M. iowae</i> )
<i>Mycobacterium avium</i>	Feces, intestine, liver, spleen, kidney	PCR	
<i>Ornithobacterium rhinotracheale</i>	Tracheal swab, trachea, lung	PCR	ELISA
<i>Trichomonas gallinae</i>	Oral mucosa, esophagus	PCR	

<b>BOVINE</b>			
<b>Disease/Pathogen</b>	<b>Specimen</b>	<b>Virology/Molecular Diagnostics Methods</b>	<b>Serology</b> [Volume of serum needed = 1ml/animal]
Bovine Adenovirus Type 1,2,3,4-8	Nasal swab, feces	PCR, VI, EM	
Bovine Coronavirus	Nasal swab, lung, trachea, feces	PCR, EM	VN
Bovine Herpesvirus 1 (BHV-1, IBR, IPV)	Nasal swab, conjunctival swab vaginal swab, trachea <b>Fetus:</b> lung, liver, kidney, adrenal gland, placenta	PCR, VI, EM	VN
Bovine Herpesvirus 2 (bovine mammillitis virus) & 4	Lesions, respiratory tissues, nasal swabs, secretions	PCR, VI, EM	

Bovine Papillomavirus	Lesions	PCR, EM	
Bovine Parainfluenza 3 Virus	Nasal swab, lung	PCR, VI, FA	VN
Bovine Parvovirus	Feces, intestine	PCR, EM	
Bovine Respiratory Syncytial Virus (BRSV)	Nasal-pharyngeal washings, deep nasal swab, lung	PCR, FA, VI, EM	VN
Bovine Rotavirus	Feces, small intestine	PCR, EM	
Bovine Viral Diarrhea Virus (BVDV) Types 1 & 2	Buffy coat (10 ml whole blood), serum, feces, intestine, Peyer's patches, spleen, mesenteric lymph node, lung, milk; <b>Fetus:</b> lung, liver, spleen, thymus, thyroid, placenta, fetal fluids	PCR, VI, FA, EM	VN
Infectious Bovine Rhinotracheitis (IBR)	<i>see Bovine Herpesvirus 1</i>		
Malignant Catarrhal Fever (MCF) Wildebeest	Buffy coat, tonsil, lymph node, kidney, liver, brain	PCR	
Parapoxvirus	Lesions	PCR, EM	
Bovine Torovirus	Feces	PCR, EM	
<i>Anaplasma marginale</i>	Whole blood	PCR	
<i>Chlamydophila abortus</i>	<b>Fetus:</b> placental cotyledons, lung	PCR	
<i>Mycobacterium bovis</i>	Abscesses, granulomas, lung, or affected lymph nodes	PCR	
<i>Mycobacterium paratuberculosis</i> (Johne's)	Feces, rectal scrapping, ileum, mesenteric lymph nodes	PCR	ELISA
<i>Mycoplasma bovis</i>	Lung, synovium, joint fluid	PCR	
<i>Neospora caninum</i>	Brain, heart, lung, placenta, skeletal muscle, tongue	PCR	ELISA
<i>Trichomonas foetus</i>	Vaginal swab, preputial washings	PCR	
<i>Ureaplasma diversum</i>	Vaginal swab, placenta	PCR	
Bovine IgG/ IgM	<b>Neonates:</b> Serum		RID

EQUINE			
Disease/Pathogen	Specimen	Virology/Molecular Diagnostics Methods	Serology [Volume of serum needed = 1ml/animal]
Equine Adenovirus pneumonia	Nasal swab, lung	VI	
Equine Coronavirus, Rotavirus	Feces	EM	
Equine Herpes Virus 1	<b>Adult:</b> Deep nasal swabs, conjunctival swab, lung, spinal cord, brain <b>Fetus:</b> Liver, lung	PCR	VN
Equine Herpes Virus 2	Nasal swabs, buffy coat (whole blood)	PCR	
Equine Herpes Virus 3	Swabs from genital/oral lesions	PCR	
Equine Herpes Virus 4	Nasal swabs, conjunctival swab	PCR	
Equine Influenza virus	Nasal swab, tracheal wash, lung	PCR, VI, EM	
Equine infectious anemia (EIA)			ELISA
Equine rhinitis A virus (Equine Rhinovirus 1)	Nasal swab, tracheal wash, lung	PCR	
Equine Viral Arteritis (EVA)	<b>Adult:</b> lung, thymus, whole blood, mesentery lymph node, liver, spleen <b>Fetus:</b> lung, spleen, thymus, placenta, liver	PCR	VN
Western Equine Encephalomyelitis (WEE)	Whole blood, cerebrospinal fluid, cerebrum, brain stem, lung, liver,	PCR	

	kidney, spleen, visceral lymph nodes		
West Nile Virus	Brain, spinal cord, cerebrospinal fluid for horse, other species have different site predilection for virus accumulation, kidney, liver, heart, etc.	PCR	
<i>Ehrlichia risticii</i> (Potomac Horse Fever)	Buffy coat (whole blood)	PCR	
<i>Sarcocystis neurona</i> (Equine protozoal myeloencephalitis, or EPM)	Brain	PCR	
<i>Streptococcus equi subsp. equi</i>	Nasopharyngeal wash, nasal swab	PCR	
Equine IgG/ IgM	Serum, <b>Fetus:</b> heart blood		RID

PORCINE			
Disease/Pathogen	Specimen	Virology/Molecular Diagnostics Methods	Serology
Hemagglutinating Encephalomyelitis	Brain, upper spinal Cord	VI, FA	
Porcine Circovirus 1 & 2 a, b	Feces, nasal secretions, lung, oropharyngeal swab, buffy coat	PCR	
Porcine Epidemic Diarrhea Virus (PEDV)	Feces, intestinal contents, intestine	PCR	
Porcine Delta Coronavirus	Feces, intestinal contents, intestine	PCR	
Porcine Parvovirus	<b>Fetus:</b> lung, Liver, kidney, spleen, placenta	PCR, EM	
Porcine Reproductive & Respiratory Syndrome (PRRSV)	<b>Adult:</b> Serum, blood swab in saline, lung, tonsil <b>Fetus:</b> lung, spleen, thymus, thoracic fluid	PCR	
Swine Influenza virus	Nasal swab, trachea, lung	PCR, VI, EM	HI, VN
Torovirus-Porcine	Feces	PCR	
Transmissible Gastroenteritis Virus (TGE)	Feces, small intestine (Jejunum)	PCR, EM	VN
<i>Actinobacillus pleuropneumoniae</i>	Lung, tonsils	PCR	
<i>Brachyspira hyodysenteriae</i>	Large intestine, feces	PCR	
<i>Brachyspira pilosicoli</i>	Large intestine, feces	PCR	
<i>Haemophilus parasuis</i>	Brain, visceral pleura and other serosal exudates	PCR	
<i>Erysipelothrix rhusiopathiae</i>	Tonsils, heart, joint swab, feces, spleen, lymph nodes	PCR	
<i>Lawsonia intracellularis</i>	Ileum, feces	PCR	
<i>Mycoplasma hyopneumoniae</i>	Lung, bronchoalveolar lavage	PCR	
<i>Streptococcus suis</i>	Lesions	PCR	

CANINE / FELINE			
Disease/Pathogen	Specimen	Virology/Molecular Diagnostics Methods	Serology
Canine Adenovirus Type 1 (Infectious Canine Hepatitis)	Liver, feces	PCR, VI, EM	
Canine Adenovirus Type 2 (Canine Respiratory adenovirus)	Nasal swab, conjunctival or pharyngeal swab	PCR, VI	
Canine Coronavirus	Feces, fecal swab	PCR, EM	
Canine Distemper virus	Buffy coat (whole blood), lung, kidney, liver	PCR, VI, EM	VN
Canine Herpes virus	Lung, liver	PCR	

Canine Influenza virus	Nasal swab, lung	PCR	
Canine Parainfluenza Virus (Kennel Cough)	Nasal swab, tracheal swab, trachea	PCR, VI	
Canine Parvovirus 2 a,b,c	Fecal swab, feces, intestine	PCR., EM	
Feline Calicivirus	Nasal swab, pharyngeal swab, lung	PCR, EM	
Feline Coronavirus	Peritoneal fluid spleen, kidney, lung	PCR, EM	
Feline Herpesvirus-1	Pharyngeal swab, nasal swab, lung, conjunctival swab	PCR, EM	
Feline Immunodeficiency virus	Whole blood	PCR	
Feline Leukemia Virus	Whole blood (1 ml)	PCR	
Feline parvovirus (Feline Panleukopenia virus)	Small intestine, kidney, liver	PCR	
<i>Bartonella henselae</i>	Whole blood	PCR	

<b>FISH &amp; AQUATIC ANIMALS</b>			
<b>Disease/Pathogen</b>	<b>Specimen</b>	<b>Virology/Molecular Diagnostics Methods</b>	<b>Serology</b>
Epizootic Haematopoietic Necrosis virus	Kidney, spleen, liver	PCR, VI, EM	
Infectious Hematopoietic Necrosis Virus (IHNV)	Kidney, spleen, liver, gills, mucus, whole fish	PCR, VI, EM	
Infectious Pancreatic Necrosis virus (IPNV)	Pyloric caecum, spleen, kidney, brain	PCR, VI, EM	
Infectious Salmon Anemia virus (ISAV)	Gills, heart, liver, kidney, spleen	PCR	
Koi Herpes virus (Cyprinid herpesvirus 3)	Gill, kidney	PCR	
Nodavirus-Fish	Heart, kidney, spleen	PCR	
Phocine Distemper virus	Whole blood, nasal, pharyngeal or ocular swabs, trachea-bronchial lymph nodes, spleen, liver, kidney, lung and brain	PCR	
Piscine Reovirus	Heart, kidney, liver, spleen, gills	PCR	
Salmon Alphavirus	Organs, viremic serum	PCR	
Salmon Herpes virus	Liver, kidney, spleen	PCR, VI, EM	
Seal Herpes virus	Whole blood, nasal, pharyngeal or ocular swabs, trachea-bronchial lymph nodes, spleen, liver, kidney, lung and brain	PCR	
Spring Viremia of Carp virus	Whole fish (small fish - less than 4 cm), viscera including the kidney and encephalon from fish 4 to 6 cm long, kidney, spleen, liver, gills and encephalon from larger fish	PCR	
Taura Syndrome Virus	Haemolymph, pleopods, whole small shrimp	PCR	
Totivirus	Heart	PCR	
Viral Hemorrhagic Septicemia Virus (VHSV)	Kidney, spleen, liver, brain, whole fish	PCR, VI, EM	
White Spot Syndrome Virus	Samples of or from the pleopods, gills, haemolymph, stomach or abdominal muscle	PCR	
White Sturgeon Herpesvirus	Skin lesions	PCR	
White Sturgeon Iridovirus	Gill	PCR	
Yellow Head Virus	Lymphoid organ, gill	PCR	
<i>Aeromonas salmonicida</i> (Furunculosis)	Liver, heart, spleen, kidney, intestinal contents	PCR	

<i>Arthrobacter davidanieli</i>		PCR	
<i>Bonamia ostreae</i> - Oyster	Live or freshly dead oyster, Gills and/or heart	PCR	
<i>Ceratonova shasta</i>	Tissue lesions, intestinal scrapes	PCR	
<i>Flavobacterium columnare</i>	Gills, lesions from mouth and skin	PCR	
<i>Kudoa thyrsites</i> (Salmon Soft Flesh Disease)	Muscle tissue	PCR	
<i>Loma salmonae</i>	Gills	PCR	
<i>Myxobolus cerebralis</i> (Whirling disease)	Lesions	PCR	
<i>Neoparamoeba perurans</i>	Gills	PCR	
<i>Nocardia seriolae</i>	Spleen, kidney, liver, or brain displaying granulomatous lesions	PCR	
<i>Nucleospora salmonis</i>	Kidney, blood, feces	PCR	
<i>Piscirickettsia salmonis</i>	Kidney, liver, spleen	PCR	
<i>Renibacterium salmoninarum</i> (Bacterial Kidney Disease)	Kidney	PCR	
<i>Tenacibaculum maritimum</i> (formerly <i>F. maritimus</i> )	Lesions from mouth	PCR	
<i>Yersinia ruckeri</i>	Internal organs	PCR	

### MISCELLANEOUS

Disease/Pathogen	Specimen	Virology/Molecular Diagnostics Methods	Serology
Aleutian Mink Disease virus	Whole blood	PCR	
Mink Enteritis Virus (Parvovirus)	Intestine, liver, lung kidney	PCR, EM	
Bat white-nose syndrome, <i>Pseudogymnoascus destructans</i>	Skin and mucocutaneous swabs: wing webbing, snout, conjunctiva	PCR	
Bearded Dragon Adenovirus	Liver	PCR, EM	
Boid Snake Retrovirus	Liver, kidney, esophageal tonsils	PCR	
Epizootic Hemorrhagic Disease 1 & 2	Whole blood (cattle & deer) spleen, lymph node, lung, liver (deer)	PCR	
Frog chytrid fungus, <i>Batrachochytrium dendrobatidis</i>	Skin, digit, cutaneous swab, tadpoles, whole body rinse	PCR	
Frog Iridovirus	Kidney, digestive tract, cloacal swab	PCR, EM	
Lab mice <i>Helicobacter bilus</i>	Liver	PCR	
Lab mice <i>Helicobacter hepaticus</i>	Liver	PCR	
Ophidian (Snake) Paramyxovirus	Liver, kidney, lung, esophageal tonsils, brain/spinal cord,	PCR, EM	
Rabbit, <i>Encephalitozoonosis</i>	Kidney, urine	PCR	
Rabbit Hemorrhagic Disease (Calicivirus)	Liver, blood, spleen	PCR	
Squirrel Adenovirus	Feces, intestine	PCR, EM	
<i>Cryptococcus neoformans</i>	Brain, lung, lymph node, lesions	PCR	
<i>Cryptosporidium spp.</i>	Small intestine, feces, fecal swabs	PCR	
<i>Francisella tularensis</i>	Oropharyngeal swab, whole blood, liver, spleen	PCR	
<i>Listeria monocytogenes</i>	Brain, abscess, liver, lesions	PCR	