

# Avian Influenza:

## Part 1 – Understanding Avian Influenza

### AVIAN INFLUENZA

### NEWCASTLE DISEASE

### AVIAN METAPNEUMOVIRUS

### INFECTIOUS BRONCHITIS IBV

### TURKEY CORONAVIRUS

### CHICKEN INFECTIOUS ANAEMIA

### GUMBORO

### MAREK'S DISEASE

### AVIAN ADENOVIRUS

### DUCK VIRAL ENTERITIS

### AVIAN ENCEPHALOMYELITIS

### DUCK VIRAL HEPATITIS

### AVIAN NEPHRITIS

### AVIAN REOVIRUSES

**A**vian influenza remains one of the most significant transboundary diseases affecting the global poultry sector. Despite decades of research, vaccination and surveillance, outbreaks continue to occur across continents, challenging production, trade and animal welfare. For veterinarians and poultry specialists, understanding the virus's foundations, its structure, forms and routes of spread is essential for interpreting current risks and designing sound control measures.

### **A virus is defined by its structure and diversity**

Avian influenza viruses belong to the Orthomyxoviridae family and contain segmented, single-stranded RNA within a lipid envelope. Two surface glycoproteins, haemagglutinin (H) and neuraminidase (N), determine subtype identity. In birds, 16 H and 9 N subtypes are recognised, while two additional types have so far only been detected in bats. Combinations such as H5N1 or H9N2 influence host range, virulence and vaccine compatibility. Gradual genetic change, known as antigenic drift, or the swapping of entire gene segments, known as reassortment, can produce new field variants that evade existing immunity and complicate disease control.

### **Low and highly pathogenic forms**

Field isolates are classified as low pathogenic or highly pathogenic by experimental infection of young chickens or by molecular markers at the haemagglutinin cleavage site. Low pathogenic viruses usually replicate in the respiratory and intestinal tracts, causing mild or unapparent infection. Some H5 and H7 low-pathogenic strains can, however, mutate to highly pathogenic forms, acquiring the ability to replicate throughout the body and cause rapid mortality. This change illustrates how easily the epidemiological situation can alter once the virus circulates within large poultry populations.

### **Hosts and ecological reservoirs**

Wild waterfowl, including ducks, geese and shorebirds, act as the natural reservoirs of avian influenza viruses. They often carry low pathogenic strains without illness, shedding virus into surface water that may later be used by domestic birds. Migration patterns and cooler temperatures favour environmental survival and increase exposure risk for poultry, particularly in outdoor or free-range systems where contact between wild and domestic species is difficult to prevent.

### **Transmission and persistence**

In poultry, infection spreads both directly, through contact with infected birds, and indirectly, via contaminated faeces, litter, feed, water, clothing and equipment. The virus remains viable for longer in moist, cool conditions and can persist for extended periods in water or organic material. The movement of people, vehicles and equipment between houses or farms continues to play a major role in dissemination. Recent detections of H5N1 in non-avian species highlight the virus's adaptability and reinforce the importance of continued surveillance across animal populations to protect poultry health.



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# Poultry HealthBITES

## Global Threats & Trade Diseases

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### Patterns of disease and impact

Clinical expression ranges from mild respiratory signs and reduced production to sudden, near-total mortality, depending on strain and species. Highly pathogenic outbreaks can destroy entire flocks within days, while low pathogenic infections may quietly depress performance yet still trigger trade restrictions once detected. The economic and logistical effects extend far beyond the farm, influencing input suppliers, exporters and consumer confidence. Effective prevention, therefore, depends on coordination between industry, veterinary authorities and wildlife agencies under a broader one health perspective.

### Towards informed control

Recognising the biological complexity of avian influenza is the starting point for effective management. Control measures must take account of viral diversity, host ecology and the realities of poultry production. Approaches range from complete culling to targeted vaccination, such as current programmes in ducks in parts of Europe, each bringing distinct practical and trade considerations that will be examined later in this series.

In Part 2, How the Virus Evolves, we explore how mutation, reassortment and ecology drive continual viral change, and whether surveillance and response systems can keep pace.