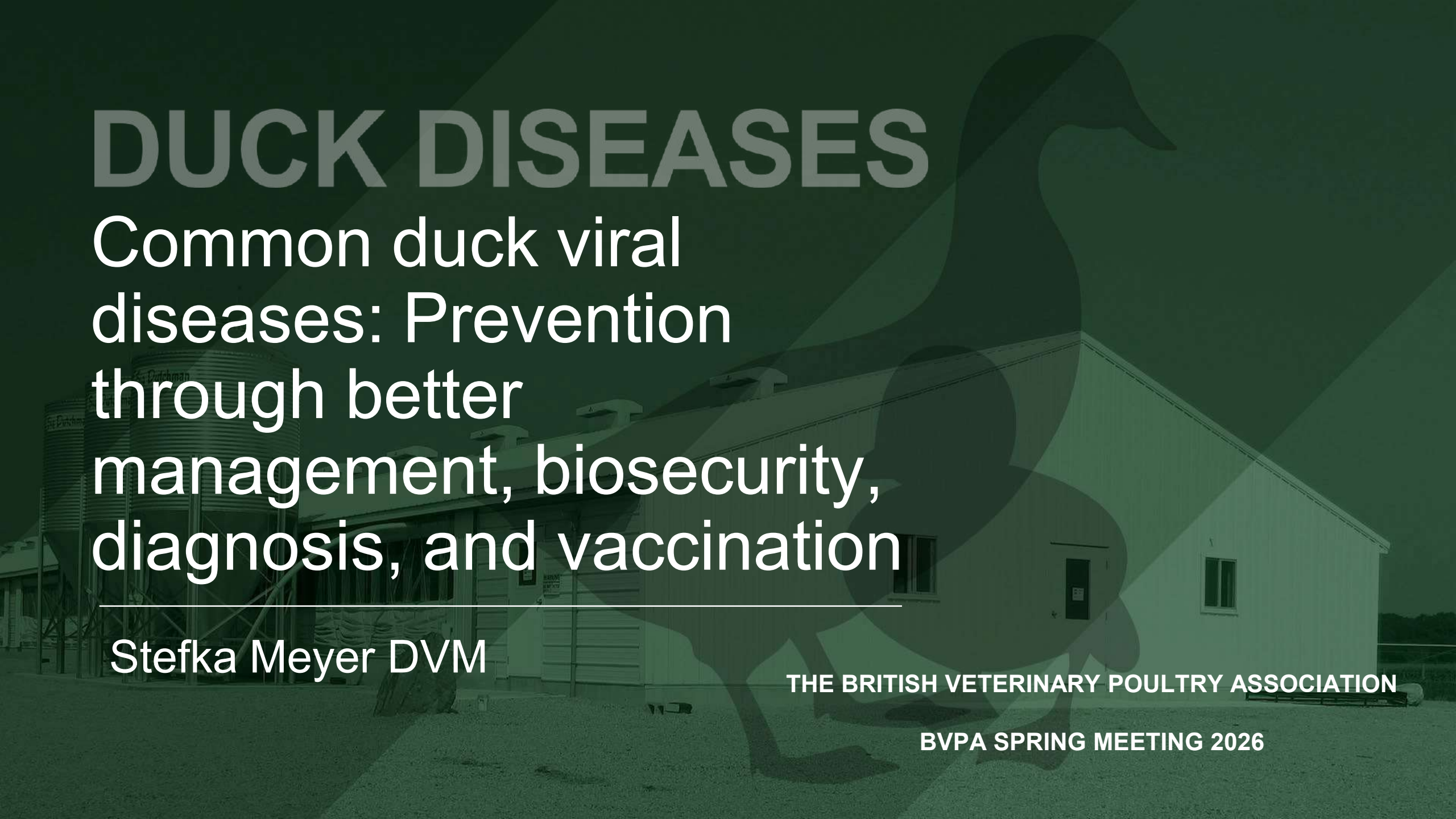


# DUCK DISEASES

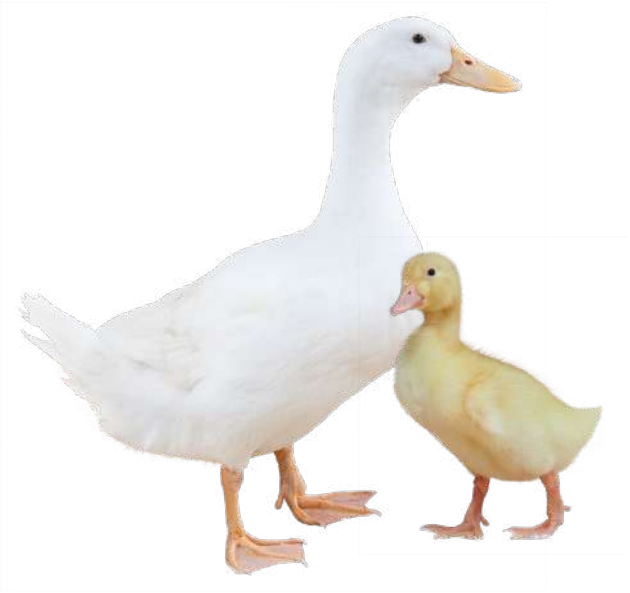
## Common duck viral diseases: Prevention through better management, biosecurity, diagnosis, and vaccination

Stefka Meyer DVM

THE BRITISH VETERINARY POULTRY ASSOCIATION

BVPA SPRING MEETING 2026

# POULTRY PRODUCTION
# OVER THE YEARS



- Poultry production has grown tremendously over the past 50 years. The market for poultry products is still growing in many countries and is highly competitive
- Chickens, turkeys, and ducks are farmed globally. This amazing growth is possible due to several developments:

Genetic Improvement

Stimulated Hatchery

Control of infectious and parasitic diseases by:

- Improved nutrition
- Utilizing vaccines to control viral infections
- Eradication of important bacterial infections by separation of the generations, selective medication and isolation of stock

# THE IMPORTANCE OF BIOSECURITY

Everyone involved in poultry production, regardless of being an owner, manager, farm worker, contractor, driver or veterinarian must have proper knowledge of the objective and what it means in practice.

**Biosecurity – An expert's definition:**

**“All measures, which can or should be taken to help prevent viruses, bacteria, fungi, protozoa, parasites, insects, rodents and wild birds from entering or surviving a facility and infecting or endangering the well-being of the poultry flock.” (Gooderham, 2002)**

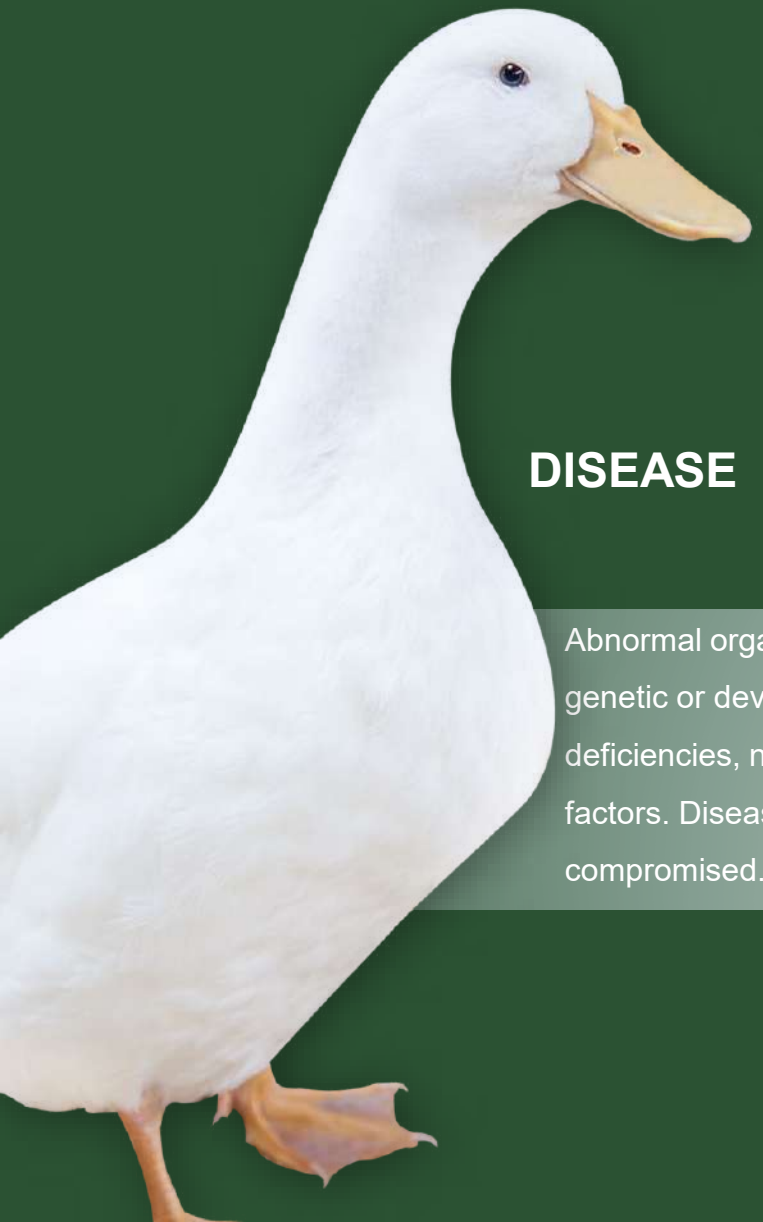
# MAXIMIZING GENETIC POTENTIAL

MANAGEMENT: Managing ventilation, air quality, temperature and density to meet the ducks age-specific needs.

DISEASE PREVENTION: Preventing, detecting, and treating disease.

FEED AND WATER: Ensuring that nutritional and water consumption needs are met.

DUCK WELL-BEING: Fostering strong foundational values of duck well-being through proper handling of ducks and prevention of injury.



# DEFINING DISEASE AND INFECTION

## DISEASE

Abnormal organ function and structural damage caused by genetic or developmental defects, infections, toxins, nutritional deficiencies, nutritional imbalances, and adverse environmental factors. Disease occurs when the body's normal functions are compromised.

## INFECTION

The process when pathogenic microorganisms invade the body, settle, grow, and multiply in tissues and organs, causing a series of pathological changes. In duck farming, infectious diseases are mainly caused by pathogens such as bacteria, viruses, fungi, and parasites.

# Characteristics of Viral Diseases

Caused by a specific agent.

Contagious and epidemic

- Under certain conditions, the disease can be transmitted to other individuals in the same duck flock, or to other duck flocks in the same farm, to duck flocks in other farms or regions, causing the same or similar symptoms, leading to the spread and epidemic of the disease.

After the invasion and multiplication in a duck's body, this can trigger a series of specific immune responses, producing specific antibodies. These immunological responses or specific antibodies can be detected using specific methods.

- Ex: Avian influenza virus triggers an immune response, and hemagglutination inhibition tests can be used to detect influenza virus-specific antibodies.

Viral diseases have certain patterns of onset and clinical manifestations. They have relatively stable incubation periods, disease progression, and clinical manifestations.

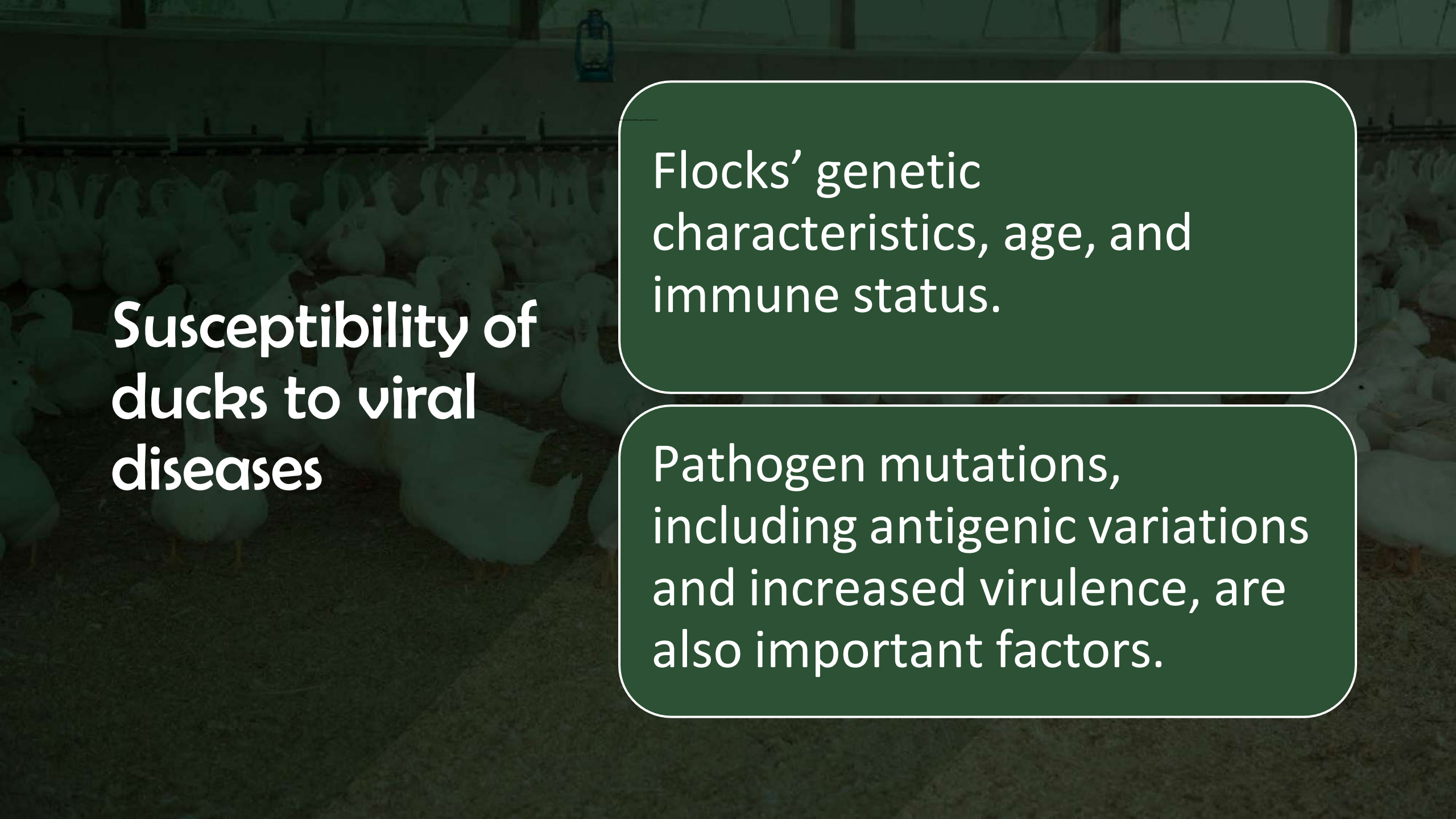
# TRANSMISSION

**Horizontal transmission:**

- Direct contact (such as pecking or mating)
- Contact of susceptible ducks and infected animals (sources of infection),
- Indirect contact, i.e., through the transmission of pathogens to susceptible ducks via external environmental factors (transmission vectors).
- Transmission via the respiratory tract, Transmission via the digestive tract, Vector-borne transmission

**Vertical transmission:**

- The transfer of pathogens from breeding ducks to offspring ducklings via hatching eggs.



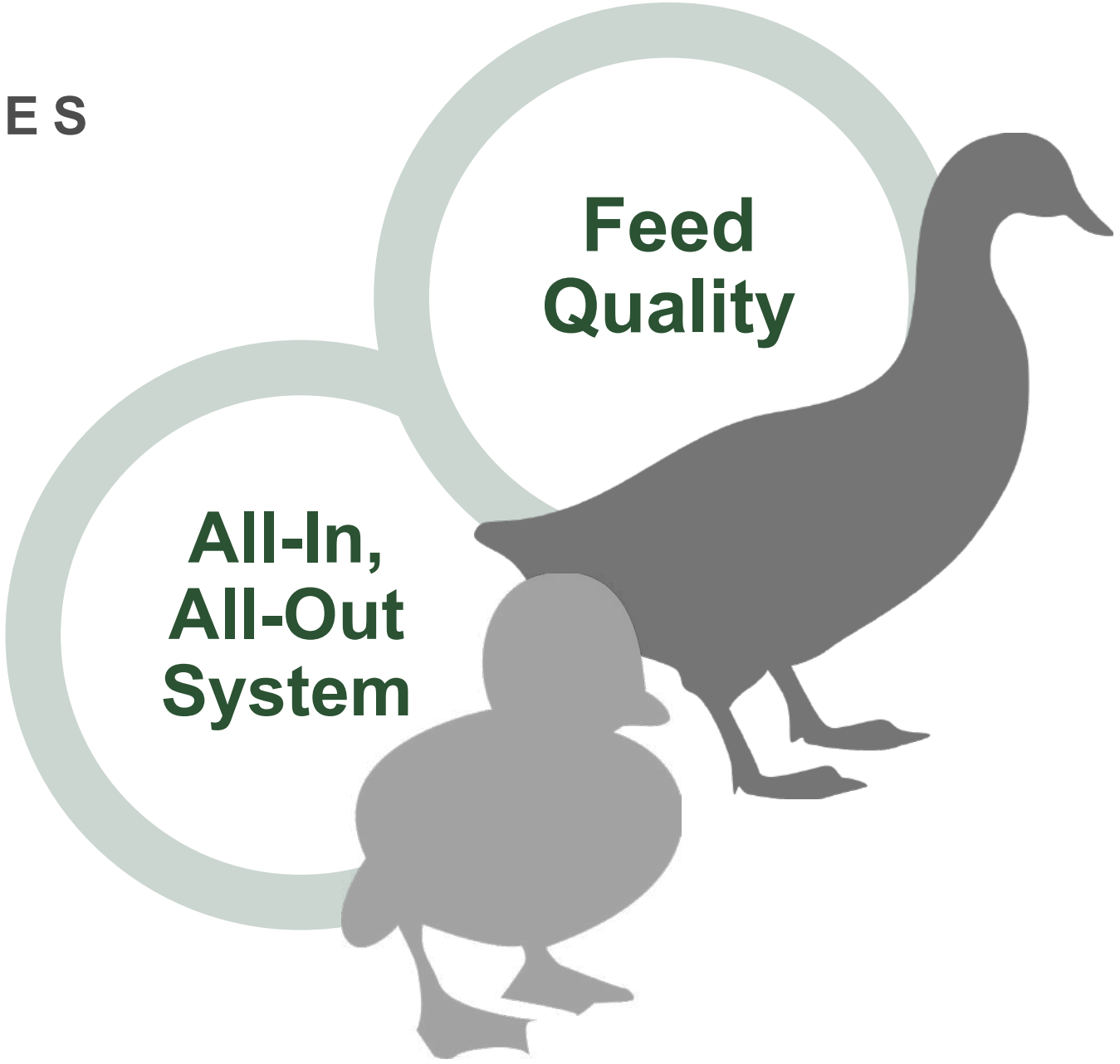
# Susceptibility of ducks to viral diseases

Flocks' genetic characteristics, age, and immune status.

Pathogen mutations, including antigenic variations and increased virulence, are also important factors.

# PREVENTION OF INFECTIONS DISEASES ON DUCK FARMS

If disease prevention is carefully considered and implemented when constructing new farms and arranging production, facilities do not need to be entirely new, but they should be adequate. Diseases can often be eradicated and eliminated by expanding existing poultry farms and reorganizing production. Many old poultry farms, hatcheries, and feed mills can be redesigned and renovated to meet the requirements for disease eradication, elimination, or control.



# Farm Design Considerations

| | | |
|---|---|---|
| Climate: | Water supply: | Building capacity |
| Flooring | Roofing: | Ceiling insulation: |
| Heating systems: | Lighting: | Biosecurity: |
| Drainage | Building perimeter: | |

- Restrict visitors
- Change footwear prior to entering the barn or provide disposable boots
- Provide disposable coveralls for all visitors
- Properly clean and disinfect equipment before bringing it onto the farm
- Follow established cleaning and disinfection procedures
- Use all-in all-out production systems with adequate down time between flocks
- Ensure feed and water supplies are protected
- Regularly clean open water systems daily
- Keep building perimeters free of vegetation and clutter
- Maintain a rodent control program—check bait weekly
- Properly dispose of mortality, litter and manure

- Thoroughly investigate and monitor for disease throughout the production system
- Know what to expect and be alert to the unexpected
- Observe, investigate, identify and act using a systematic approach
- Realize that vaccination alone cannot protect flocks against overwhelming disease challenges or poor management
- Minimize disease challenges through well-designed and implemented biosecurity and management programs
- Handle vaccines properly. Mishandled vaccines may be useless.
- Give medication only after the pathogen has been determined and with the approval of the veterinarian.

# NUTRITION

- **Water Consumption, Quality, and pH Levels**
  - Water is an essential nutrient that impacts virtually all physiological functions in a duck. In fact, water comprises 65 to 78% of the body composition of a duck depending on its age. Therefore, it is critical that ducks have access to adequate supplies of good quality water.
  - Measurements of water quality include pH, mineral levels, and the degree of microbial contamination.
- **Mineral content**
  - If iron is a concern, filtration systems and chlorination are effective controls. It is advisable to filter the water supply using a filter with a mesh of 20–25 microns.
- **Microbial contamination**
- **Feed**
- **Crude protein**
- **Energy**
- **Micronutrients**

# DISINFECTION

## COMMONLY USED METHODS

01

Physical Disinfection

- This method utilizes physical agents
  - Heat sterilization
  - Air filtration
  - Radiation sterilization (Ex: ultraviolet radiation disinfection)
  - Plasma Sterilization

02

Chemical Disinfection

- This method uses chemical disinfectants to kill pathogenic microorganisms

03

Biological Disinfection

- This method is based on the characteristics of bacteriophages

# DISINFECTION EFFECTIVENESS

- **Relative humidity**
- **pH** has a significant impact on the effectiveness of chemical disinfectants - quaternary ammonium compounds are more effective in alkaline solutions; the dosage required to kill microorganisms at pH 3 is 10 times greater than at pH 8. A 2% glutaraldehyde aqueous solution requires 35 minutes to kill 99.9% of bacterial spores at pH 3.6, but less than 15 minutes at pH 7.8.
- **Chemical antagonists**: In chemical disinfection, organic contamination in the object being disinfected can not only block the interaction between the disinfectant and pathogenic agent, but also consume some of the disinfectant through chemical reactions. In addition, other antagonists, such as soap or anionic detergents, can neutralize the effects of quaternary ammonium salt disinfectants; sodium thiosulfate can neutralize the effects of hypochlorite

# PHYSICAL DISINFECTION METHODS

- Thermal Sterilization
- Dry Heat Sterilization
- Moist Heat Sterilization
- Radiation Disinfection
  - Ultraviolet disinfection equipment includes ultraviolet disinfection lamps and sterilizers.

# CHEMICAL DISINFECTION METHODS

- Aldehyde Disinfectants
  - Formaldehyde, polyoxymethylene, glutaraldehyde, etc.
- Chlorine-containing disinfectants
  - Sodium hypochlorite (10%~20%), bleaching powder (25%), bleaching powder (mainly calcium hypochlorite, 80%~85%), and trisodium phosphate chloride (3%~5%); the other is organic chlorine compound disinfectants, such as sodium dichloroisocyanurate (60%~64%), trichloroisocyanuric acid (87%~90%), and chloramine T (24%).
- Iodine-Containing Disinfectants
- Quaternary Ammonium Salt Disinfectants
- Peroxide Disinfectants
  - Peracetic acid, hydrogen peroxide, perglutaric acid, persuccinic acid, and ozone.
- Copper Sulfate

# Hatchery Hygiene

- Site selection and construction of the incubator
- Ventilation within each functional area of the building should be relatively independent to avoid cross-flow of air
- Cleaning and hygiene of hatching eggs
- Disinfect the hatching eggs before incubation
  - Liquid cleaning and disinfection
  - Fumigation Disinfection
  - Spray disinfection of hatching eggs
  - Egg wash

# Diagnosis of Duck Diseases

Clinical and medical history investigation The occurrence, development, and clinical manifestations of most infectious diseases follow certain patterns.

Check the ventilation and insulation of the duck house.

Recent feed change

Sample collection, submission for testing, or consultation with veterinarians

perform necropsy and sampling in a necropsy room or take them to a specialized laboratory.

Blood samples.

Isolate suspected duck flocks

# LABORATORY DIAGNOSIS

Anatomical examination of ducks

Posting

Pathogen isolation and identification

Virus Isolation

Sample Inoculation

Duck or Chicken Embryo Inoculation

Cell Culture

Laboratory Animal inoculation

Virus Identification – Morphological observation, immunological identification

One of the most widely used techniques in diagnosis: PCR

# VACCINE IMMUNITY

The immune defense system of ducks includes early innate immunity (or natural immunity) and adaptive immunity.

Type of vaccines: inactivated vaccines and live attenuated vaccines

Inactivated vaccines used for commercial ducks are generally made from whole bacteria or whole viruses with adjuvants.

Live vaccines, such as duck plague vaccines, have been widely used in commercial duck farming and have been tested in practice over time. They offer good immunoprophylaxis for duck flocks and are relatively economical.

With advances in genetic engineering, new types of vaccines have been developed, including live virus vector vaccines, bacterial vector vaccines, and gene-deleted vaccines. Examples include recombinant turkey herpesvirus vaccines expressing avian influenza genes and duck plague virus vector vaccines expressing avian influenza virus genes

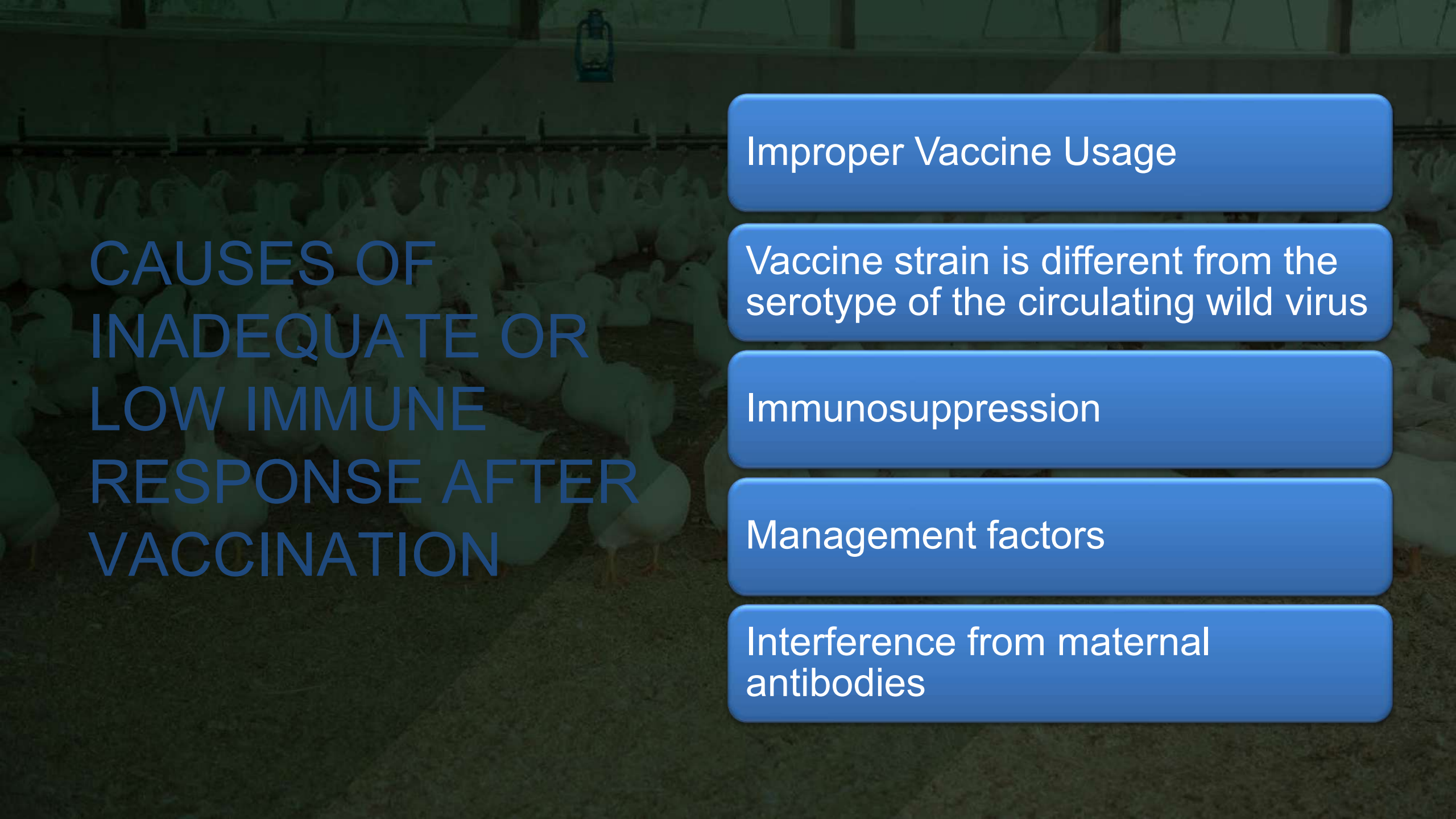
# SEROLOGICAL MONITORING

VACCINATION SCHEDULE: Flocks are vaccinated consistently according to a certain immunization program.

ANTIBODIES: Antibodies can be detected in the serum of poultry 1-3 weeks after immunization.

UNKNOWN DISEASES: When a flock is infected with an unknown disease, a more effective diagnostic approach is to collect and test duplicate serum samples from both the acute and recovery phases.

EXAMPLES IN PRACTICE: AI vaccination in Africa and Asia. Baseline establishment involves serological testing, regular monitoring throughout the egg-laying period is also necessary. This allows for the assessment of vaccine efficacy and the detection of wild-type virus infection. If the antibody titer in breeding ducks is found to be too low, booster immunization can be administered during the egg-laying period.



# CAUSES OF INADEQUATE OR LOW IMMUNE RESPONSE AFTER VACCINATION

- Improper Vaccine Usage
- Vaccine strain is different from the serotype of the circulating wild virus
- Immunosuppression
- Management factors
- Interference from maternal antibodies

# DUCK DISEASES

- **Duck Tembusu Virus Infection**
- **Duck Reovirus Infection**
- Duck Plague/DVE
- Duck Hemorrhagic Disease
- Muscovy Ducks' Parvovirus Infection
- Muscovy Duck Gosling Plague
- Duck Short-Beaked Dwarf Syndrome
- Duck Parvovirus
- Duck Adenovirus
- Duck Circovirus Infection
- Duck Hepatitis B Infection
- Avian Influenza
- Duck Viral Hepatitis A (DHAV)
- Duck Astrovirus Infection
- West Nile Virus Infection
- Duck Paramixovirus Infection
- Duck Metapneumovirus Infection

# Duck Tembusu virus Infection

## *Affected Birds*

- Muscovy ducks, Peking ducks, hybrid Muscovy ducks, and geese, sparrows and dead pigeons, chickens

## *Etiology*

- Duck Tembusu virus belongs to the family Flaviviridae

## *Epidemiology*

- transmitted by insect vectors, horizontal transmission can also occur in duck and goose flocks.
- The ovary, as target organ of the virus, makes hatching eggs laid during infection highly susceptible to viral contamination, leading to vertical transmission of the virus, horizontal transmission

## *Clinical Symptoms*

- duck Tembusu virus (DTV) primarily spreads horizontally in laying duck flocks. Typically, a decrease in feed intake and egg production first appears in one or a few pens of a duck house, spreading to the entire house within 1-2 days, excreting green, watery feces, ataxia
- MD- neurological symptoms

## *Pathological changes*

- follicle hemorrhage, rupture, atrophy, and yolk peritonitis in laying ducks,
- Splenomegaly

## *Diagnosis*

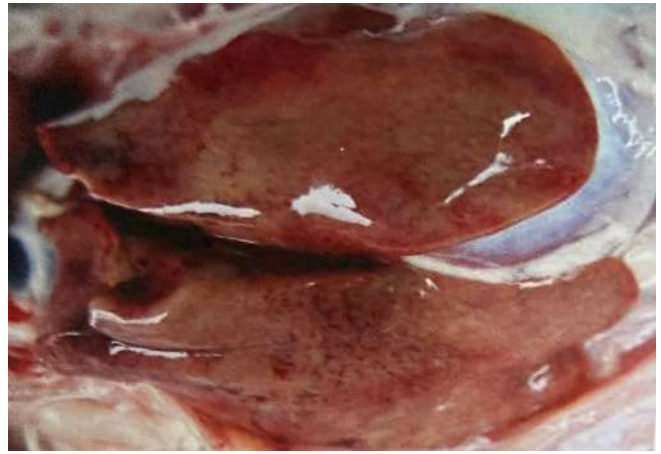
- include ELISA, neutralization test and latex agglutination test
- RT-PCR

## *Prevention*

immunizing breeding ducks or laying ducks with oil-adjuvanted inactivated vaccine 2-3 weeks before the start of egg production provided significant protection against virulent infection. Ducklings vaccinated with oil-adjuvant vaccine once at 5-7 days of age showed good protection against experimental infection 3 weeks later

# Duck Tembusu virus Infection

# Duck Tembusu virus Infection



# Duck Reovirus infection

*Affected Birds*

- Muscovy, Mallard, Pekin ducks,

*Etiology*

- Duck Reovirus

*Sensitivity*

- Duck reovirus is heat-resistant,
- insensitive to ether, slightly sensitive to chloroform, and sensitive to ultraviolet light, and pH.

*Epidemiology* Affects ducks from 4 and 22 days old.

*Clinical Symptoms*

- soft legs, white watery feces, and significantly delayed growth and development, depression, mortality rate is 5%–15%. Adult- egg drop, no obvious clinical symptoms.

*Pathological changes*

- multi-organ necrosis- liver, spleen, myocardium, bones, bursa Fabricius inflamed
- Cerebral edema and hemorrhages in the meninges.

*Diagnosis*

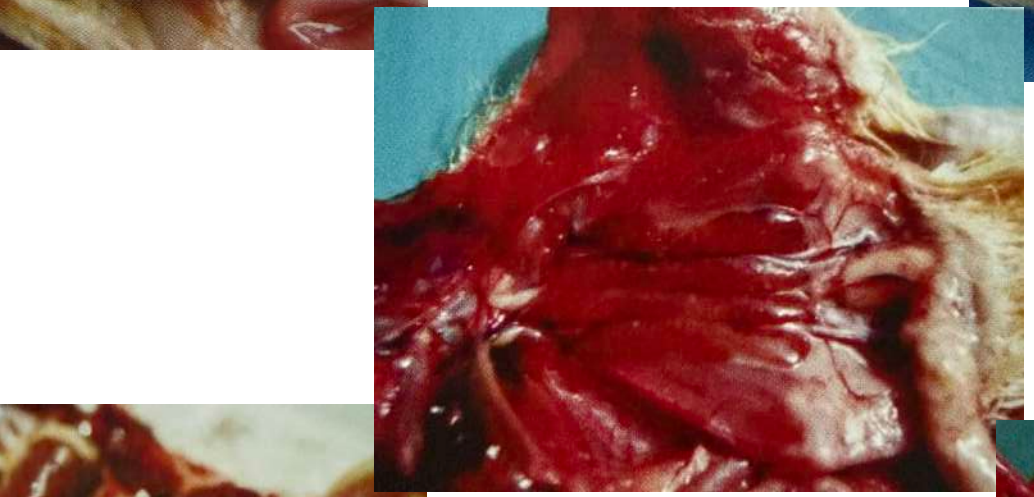
- ELISA, PT-PCR

*Prevention*

- Inactivated and live attenuated vaccines provide good protection for duck flocks

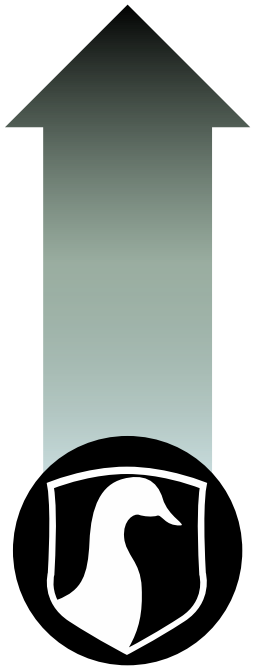
# Duck Reovirus infection

# Duck Reovirus infection

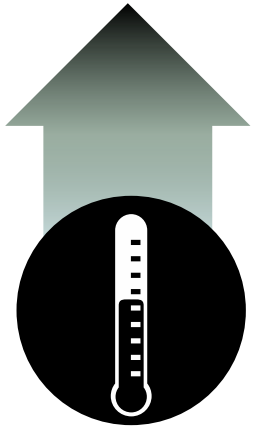


# Duck Reovirus infection

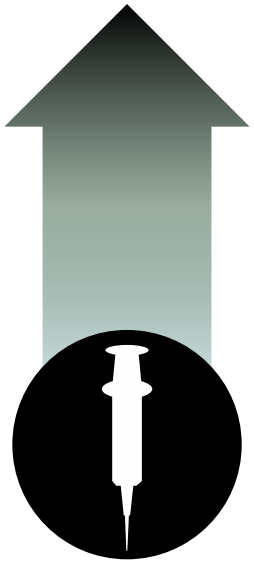
# Prevention is Always Cheaper Than Treatment



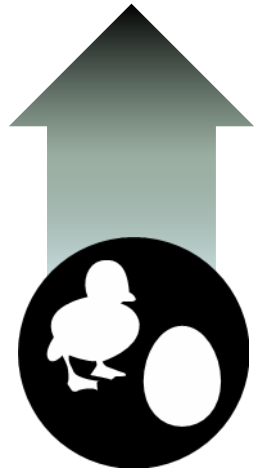
High level of biosecurity



Prevention and Control of health-related issues



Proper Vaccination Program



Medication

References:


- Maple Leaf Farms Duck Rearing Book
- Duck Diseases – Su Jungiang, Huang Yu, Hy Xueying



The pictures and data presented in this presentation has taken the collaborative efforts of many people. Special Recognition to the Maple Leaf Farms International Live Production Technical Team.

# Thank you !

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# Duck Plague/ DVE

*Affected Birds*

- Ducks, geese, and swans

*Etiology*

- Duck herpesvirus 1

*Sensitivity*

- Ether and chloroform
  - Heating at 56°C for 10 min. or at 50°C for 90-120 min at room temperature (22°C) for 30 days

*Clinical Symptoms*

- Incubation period: 2-7 days
- Fever, lethargy, ruffled feathers, appetite suppression.
- Ataxia, Neurological symptoms. Nasal discharge, dark colored feathers around the eyes, diarrhea.
- Ducks usually die within 1-5 days high mortality rate. Adult ducks egg drops.
- Commercial ducklings- 2-7 weeks – 5-100%.

*Pathological Changes*

- Hemorrhage and necrosis of the digestive tract mucosa and internal organs
- All lymphatic organs are affected; the spleen was enlarged, dark in color

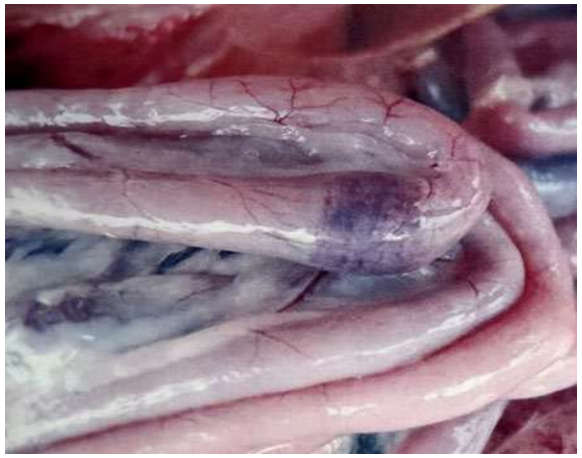
*Diagnosis*

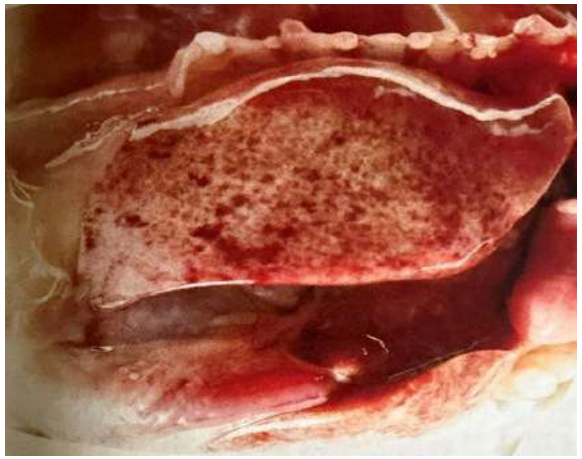
- The virus can be isolated by inoculating a monolayer of duck embryo fibroblasts. Typically, duck embryos begin to die 3-5 days after inoculation.
- The virus neutralization test.
- Monoclonal antibodies ELISA, PCR

*Prevention*

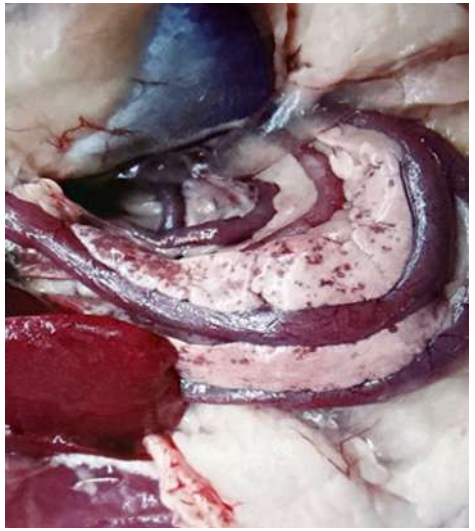
- Passive Immunity, emergency Immunization

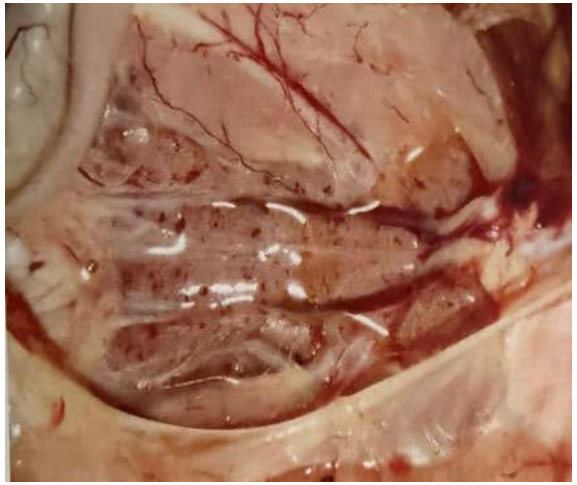
# Duck Plague/ DVE





# Duck Plague/ DVE






*Affected Birds*

- Muscovy ducks, Mallards, wild ducks, Muscovy ducks aged 10-55 days are most susceptible.

*Etiology*

- duck herpesvirus type 2, also known as duck hemorrhagic disease virus (DHDV). It is a new member of the Herpesviridae

*Sensitivity*

- DHDV is intolerant to acids (pH 3, 4℃ for 2 hours), intolerant to alkalis (pH 11, 4℃ for 2 hours), and not very heat-resistant

*Epidemiology*

- Younger ducks under 55 days old have higher mortality rates-80%. In flocks older than 55 days 1.0%–1.7% with increasing age. The course of the disease is 5-10 days

*Clinical Symptoms*

- The incubation period 4-6 days.
- Diarrhea- white or green watery feces.
- bleeding or bruising inside the feather tubes of the wings as purplish-black appearance
- The tips of the beaks, claws, and webbed feet of dead ducks turn cyanotic and purplish black

*Pathological Changes*

- The liver is slightly enlarged, with dendritic hemorrhages
- The pancreas often bleeds.
- Hemorrhages- duodenum, rectum, cecum.
- Meningeal hemorrhages
- Hemorrhage on the surface of Bursa of Fabricius

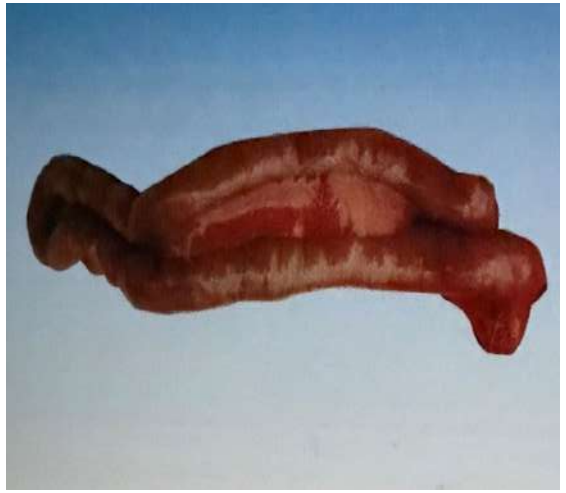
*Diagnosis*

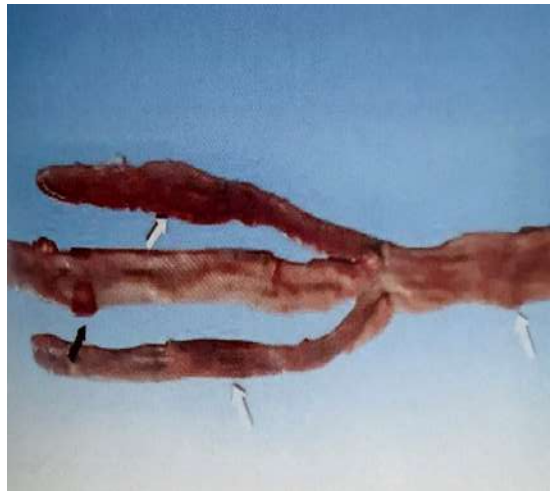
- virus isolation and identification, hemagglutination inhibition test, neutralization test, cell immunofluorescence test and PCR.

*Prevention*

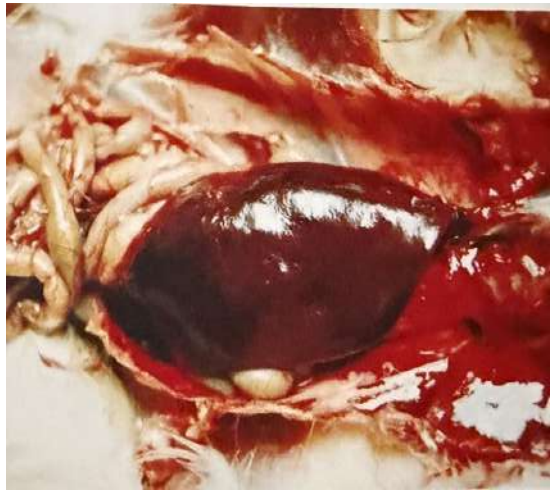
- ducks recovered from natural DHDV of resistance to reinfection. Experimental studies have hyperimmune egg yolk antibodies (1.5~3.0mL/bird) wide-spectrum antibiotics to prevent secondary bacterial infection.
- shown that the use of attenuated live vaccines and inactivated vaccines in meat ducks and breeding ducks can induce good active immunity

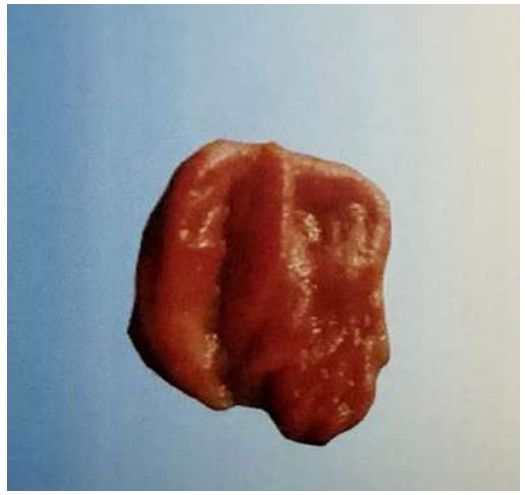
# Duck Hemorrhagic Disease





# Duck Hemorrhagic Disease





# Muskovy duck's Parvovirus

*Affected Birds*

- primarily affects Muscovy ducklings aged 7-21 days,(as early as 4 days old). Mortality rates decrease significantly after 21 days of age.

*Etiology*

- Parvovirus

*Sensitivity*

- MDPV is resistant to ether, chloroform, trypsin, acid and heat, and is stable to a variety of chemicals.

*Epidemiology*

- Transmission-digestive and respiratory tract. Infected eggs are one of the main reasons for the spread of the disease in hatcheries.

*Clinical Symptoms*

- The incubation period 4-9 days.
- The course of the disease is 2-7 days.
- Acute and subacute forms.

Acute form: Muscovy ducklings aged 7-14 days

Subacute form: older Muscovy ducklings. Low mortality rates.

*Pathological Changes*

- rounded heart with myocardial relaxation
- slightly enlarged liver lungs- unilateral congestion
- Most dead ducks have dilated and everted cloaca

*Diagnosis*

virus isolation (VI), neutralization test (NT), fluorescent antibody test (FA), enzyme-linked immunosorbent assay (ELISA), agar diffusion test (AGP), latex agglutination test (LPA), latex agglutination inhibition test (LPAI), nucleic acid probes, polymerase chain reaction (PCR), and loop-mediated isothermal amplification (LAMP).

*Prevention*

- Immunizing breeding ducks can provide certain maternal antibody protection for Muscovy ducklings;
- when the disease occurs, sick ducks should be isolated and injected intramuscularly with hyperimmune serum or egg yolk antibodies once a day for 2-3 consecutive days, which can achieve a certain therapeutic effect.

# Muskovy duck and gooseling Plague

*Affected Birds*

- Muscovy ducklings aged 1-4 weeks, with the earliest onset at 4 days old. mortality rate is 40%-65%..

*Etiology*

- Parvovirus

*Sensitivity*

- MDPV is resistant to ether, chloroform, trypsin, acid and heat, and is stable to a variety of chemicals.

*Epidemiology*

- Transmission-digestive and respiratory tract. Infected eggs are one of the main reasons for the spread of the disease in hatcheries.

*Clinical Symptoms*

*Pathological Changes*

- *hemorrhages*

*Diagnosis*

virus isolation (VI), neutralization test (NT), fluorescent antibody test (FA), enzyme-linked immunosorbent assay (PCR), agar diffusion test (AGP), latex agglutination test (LPA), and latex agglutination inhibition test

*Prevention*

- Vaccination

# Duck short-beaked Dwarf Syndrome

*Affected Birds*

- affects ducks from 14 days old-Muscovy and Pekin

*Etiology*

- Parvovirus

*Sensitivity*

- MDPV is resistant to ether, chloroform, trypsin, acid and heat, and is stable to a variety of chemicals.

*Epidemiology*

- Transmission-digestive and respiratory tract. Infected eggs are one of the main reasons for the spread of the disease in hatcheries.

*Clinical Symptoms*

- soft legs, low mortality, easily broken wings and legs, shortened upper beaks, stunted growth

*Pathological Changes*

- pinpoint-sized white necrotic spots on the pancreatic surface, and duodenal mucosal hemorrhage, thymic hemorrhage, tibial fracture

*Diagnosis*

- PCR, virus isolation and identification, and genome sequencing

*Prevention*

- Muscovy duck parvovirus live vaccine or goose parvovirus live vaccine

# Duck Parvovirus

# Duck Parvovirus

# Duck Adenovirus

*Affected Birds*

- Muscovy ducks, geese, pheasants, quails, and guinea fowl

*Etiology*

- duck adenovirus type 2 (DAdV-1)

*Sensitivity*

- strong resistance to external factors. It is insensitive to ether and chloroform, temperatures above 60°C for 0.5 hours can inactivate the virus. It can survive normally with a pH of 3-7

*Epidemiology*

- Duck egg drop syndrome virus (EDSV) is primarily transmitted vertically.
- Young ducks do not show clinical symptoms

*Clinical Symptoms*

- sharp drop in egg production, thin-shelled, soft-shelled, or shell-less eggs, changes in the color of the shell, deformed eggs

*Pathological Changes*

- fallopian tube edema, catarrhal inflammation of the mucosa, glandular edema, yolk peritonitis

*Diagnosis*

- Hemagglutination inhibition test, PCR

- *Prevention*

- vaccination with inactivated oil emulsion vaccine against duck egg drop syndrome virus 2-3 weeks before the start of egg production

# Duck Adenovirus

# Duck Circovirus Infection

## *Affected Birds*

- Pekin, Muscovy

## *Etiology*

- duck circovirus (DuCV) circovirus (GoCV),

## *Clinical Symptoms*

- slow growth, organ atrophy, and severe secondary infections- bacterial and viral
- *Immunosupresion*

## *Pathological Changes*

## *Prevention*

- duck circovirus genetically engineered live vector vaccines, genetically engineered subunit vaccines, and DNA vaccines can be developed to prevent and control various clinical diseases

# Duck Hepatitis B Infection

*Affected Birds*

- Ducks, geese

*Etiology*

- duck hepatitis B virus (DHV)

*Sensitivity*

*Epidemiology*

- Duck hepatitis B virus (DHBV) is primarily transmitted vertically

*Clinical Symptoms*

- related to age, infection dose, and virus strain. young ducks are more prone to developing persistent infection.
- Chronic infection
- *Pathological Changes*
- specific liver tissue lesions, necroses, fatty degeneration
- *Diagnosis*
- isotope infiltration PCR, and real-time fluorescence PCR.

*Prevention*

- currently no reports of duck hepatitis B virus infection causing economic losses to domestic duck farming

# Avian Influenza

*Affected Birds*

- ducks, geese, and wild waterfowl, quails and parrots, as well as migratory birds- cross-species transmission

*Etiology*

- highly pathogenic avian influenza viruses (HPAIV), low pathogenic avian influenza viruses (LPAIV) and non-pathogenic avian influenza viruses (NPAIV)

*Sensitivity*

- sensitive to ether, chloroform, and acetone, relatively sensitive to heat,
- relatively resistant to low temperatures, sunlight for 40-48 hours, UV – rapidly destroyed

*Epidemiology*

- Vertical and horizontal transmission.

*Clinical Symptoms*

- respiratory symptoms, significant neurological symptoms, high morbidity and mortality, egg drop, abnormal eggshells,

*Pathological Changes*

- organ hemorrhage, pancreatic necrosis or hemorrhage,

  specifically hemorrhages or hematomas in the trachea, bronchi and lungs, hemorrhages in the coronary fat, congested or hemorrhagic liver, pancreatic, meningeal, pulmonary hemorrhages, pancreatic necroses

Avian Influenza

## Diagnosis

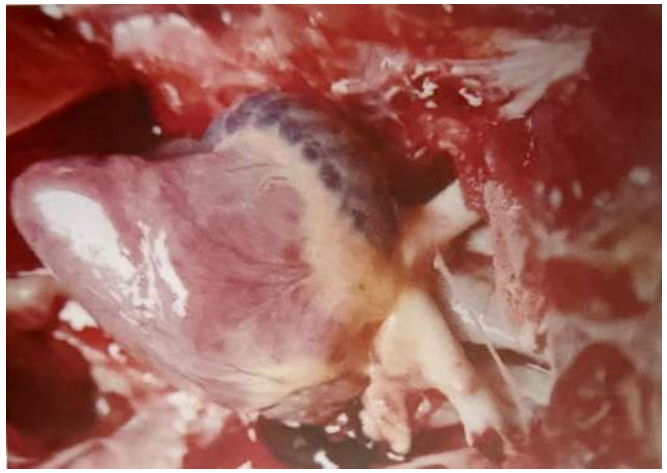
- agar diffusion test (AGID), HA and hemagglutination inhibition test (HI), serum neutralization test (SN), enzyme-linked immunosorbent assay (ELISA), immunofluorescence staining (IF), immunohistochemical staining (IH), complement fixation test (CF), real-time quantitative RT-PCR

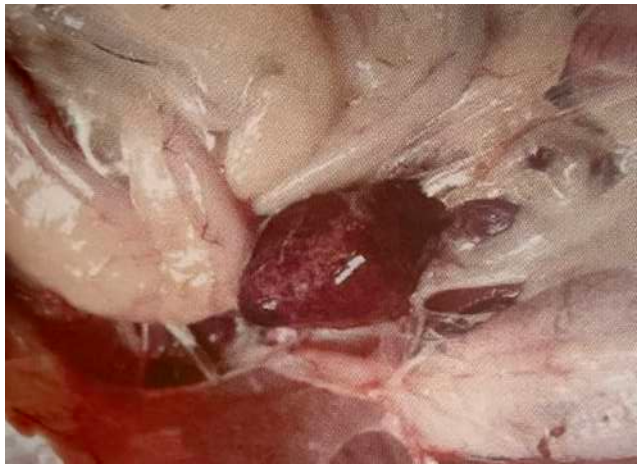
## Prevention

- The World Organisation for Animal Health (OIE) has classified highly pathogenic avian influenza (AIV) as a reportable animal disease,
- Inactivated vaccines

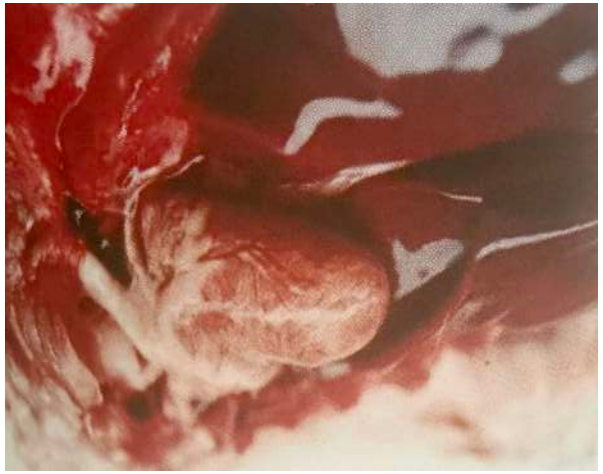
# Avian Influenza





# Avian Influenza




*Affected Birds*

- Recovered ducks can still spread the virus in their feces up to 8 weeks after infection.
- Ducks, Geese

*Etiology*

- duck hepatitis A virus (DHAV), a member of the Picornaviridae family.

*Sensitivity*

- strong resistance to external environmental and chemical factors, tolerating treatments with ether, fluorocarbons, chloroform, pH 3, and trypsin, can survive for 21 days at 37°C.

*Epidemiology*

*Clinical Symptoms*

- morbidity and mortality are mainly seen in ducklings and medium-sized ducks under one week old. The mortality rate is 10% - 90%, with a high mortality in ducks under two weeks old- rapid death, neurological symptoms, mortality is relatively low in ducks over three weeks old.

*Pathological Changes*

- liver is enlarged, fragile, and brittle, with petechiae and ecchymoses on the surface, generally, the liver of ducklings under 7-8 days old is yellowish-brown, while older ducklings often have a dark red liver. The kidneys are enlarged and hemorrhagic, gallbladder is enlarged and filled with dark green bile. The myocardium is soft, dark red, filled with non- clotting blood.

*Diagnosis*

- serum neutralization test, ELISA, PCR

*Prevention*

- live attenuated hepatitis vaccine is the most effective

of DHAV-1, inactivated vaccines

# Duck Vital Hepatitis A (DHAV)

# Duck Vital Hepatitis A (DHAV)


*Affected Birds*

- All species

*Etiology*

- Duck astrovirus belongs to the family Astroviridae

*Sensitivity*

- resistant to lipid solvents, chloroform, and other solvents, are acid-resistant (pH 3.0), and are resistant to nonionic, ionic detergents.

*Epidemiology*

- horizontally transmitted
- avian astroviruses can be transmitted between species.

*Clinical Symptoms*

- highly lethal hepatitis in ducklings
- diarrhea, indigestion, malnutrition, and emaciation. In addition, astroviruses can also cause tubular nephropathy, visceral gout, diarrhea, and stunted growth in young ducks

*Pathological changes*

- swollen livers with blunted edges and numerous petechiae or ecchymoses on the surface, pinpoint-sized white necrotic spots were visible in the pancreas, swollen and vascularized kidneys

- *Diagnosis*

- triple PCR technology
- can detect type 3 and type 1 duck astrovirus . This method is highly targeted, rapid, and simple

- *Prevention*

- the virulence of duck astroviruses type 1 and 2 can be significantly attenuated after adaptation and passage in duck embryos. Inoculation of ducklings with this attenuated strain can induce a good protective immune response, making it suitable for the immune prophylaxis of duckling astrovirus infection


*Affected Birds*

- Birds are likely the primary natural host of West Nile virus, playing a crucial role in viral amplification, transmission, and maintenance of circulation.

*Etiology*

- zoonotic infectious disease
- West Nile virus belongs to the genus Flavivirus in the family Flaviviridae

*Sensitivity*

*Epidemiology*

- Mosquitoes as a vector,
- Horizontal transmission in ducks and geese farms with high density

*Clinical Symptoms*

- Geese are the most susceptible breed of poultry. The morbidity rate in naturally infected commercial goose flocks can be as high as 60%, with geese aged 3-8 weeks being the most susceptible, older geese can also be infected. Neurological symptoms

*Pathological changes*

- encephalitis,
- myocarditis
- multifocal myocardial fiber necrosis
- multifocal necrosis in the liver, spleen and pancreas

*Diagnosis*

- RT-PCR
- detection of anti-West Nile virus antibodies, including serum neutralization tests, indirect ELISA, and competitive ELISA.

*Prevention*

- insect control measures
- Israel has developed an inactivated West Nile virus vaccine


*Affected Birds*

- Avian paramyxovirus type 1 (APMV-1) can infect most bird species, with turkeys, chickens, and pigeons being the most susceptible. Ducks, geese, and wild waterfowl, are reservoir hosts for APMV-1.

. *Etiology*

- avian paramyxovirus type 1 (APMV-1)

*Sensitivity*

- highly resistant to physical and chemical factors,
- acids and alkalis.
- Survive for several weeks at 4°C, several months at -20°C

*Epidemiology*

- fecal-oral transmission and vertical transmission

*Clinical Symptoms*

- ducklings aged 5-35 days are more susceptible, mortality rates ranging from 10% to 35%, severe cases to 90%
- Lethargy, opisthotonus,
- Adult ducks-decreased appetite and egg production, or abnormal egg production such as soft-shelled or sandy-shelled eggs.

*Pathological changes*

- white necrotic spots or hemorrhages in pancreas, slight enlargement, hemorrhage, or congestion of the liver; mild hemorrhage in the lungs congestion and hemorrhage of the meninges; cerebral edema and congestion; and splenomegaly or atrophy.

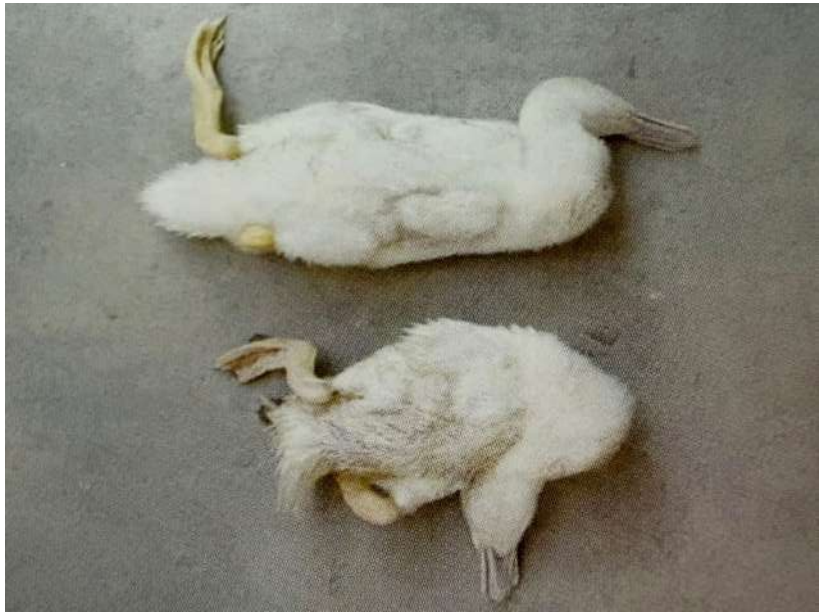
*Diagnosis*

- hemagglutination inhibition (HI) test, agar diffusion test, radiation immunodiffusion test, duck embryo neutralization test, plaque neutralization test, ELISA.
- RT-PCR

*Prevention*

- APMV-1 strain in waterfowl differs significantly from the Newcastle disease virus in chickens in terms of antigenicity, in China have developed a vaccine with the same genotype as the dominant strain circulating in waterfowl. This vaccine is expected to be widely used in waterfowl

# Duck Paramixovirus infection



# Duck Paramixovirus infection


*Affected Birds*

- turkeys, chickens, and ducks, pheasants, geese, guinea fowl, and ostriches.

*. Etiology*

- Avian metapneumovirus
- family Paramyxoviridae.

*Sensitivity*

- relatively stable between pH 3.0 and 9.0, sensitive to lipid solvents. Exposure to 56°C for 30 min. can kill the virus. Ethanol, povidone-iodine, and hypochlorite, can kill the virus. the virus can survive for about 7 days at room temperature in a dry environment

*Epidemiology*

- Horizontal transmission.
- The virus was detected in the ovaries and oviducts of infected adult ducks, indicating that the virus may be transmitted vertically.

*Clinical Symptoms*

- Muscovy ducks -respiratory infections.
- Egg production decrease-40%-85%, soft-shelled and thin-shelled eggs. Most clinical symptoms disappeared after 9-12 days. Some flocks develop secondary infections later

*Pathological changes*

- follicular hemorrhage and degeneration yellowish-white secretions or caseous material in the oviducts, and severe mucosal congestion.

*Diagnosis*

- Viral antigen detection
- Serum antibody detection, ELISA
- RT-PCR

- *Prevention*

- Attenuated vaccines, administered via aerosol, drinking water, and eye drops, can stimulate local and systemic immunity. Furthermore, there is good cross-protection between attenuated vaccines for subtypes A and B, and even cross-protection between subtypes A and B against subtype C.