

# **The Art and Science of Diagnosis of Poultry Diseases**

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The definition of disease in the broad context is any deviation from the normal state of health. Diseases can be divided into two broad categories: Infectious and noninfectious. Infectious diseases include those caused mainly by bacteria, viruses, mycoplasmas, fungi, and parasites. Non-infectious diseases can be further divided into three categories: management-related diseases, toxicities, and nutritional diseases (nutritional deficiencies/imbalance). Toxicities and nutritional diseases are self-explanatory.

Management-related diseases (problems) include those caused by errors in the areas of management and house environment such as improper beak trimming, overcrowding, inadequate ventilation, chilling, overheating, poor litter quality, high ammonia level, dusty house environment, poor water quality, and inadequate feeding and/or water space.

Mixed infections with two or more infectious agents are common, and for some diseases, it is the rule rather than the exception. Complex diseases, which result from the interaction of two or more factors (infectious and noninfectious), are also common in poultry flocks.

## **Performance parameters:**

For Poultry flocks, healthy birds that are fed balanced feed and managed properly should achieve the “performance goals” for the breed or strain of bird. So, what are the parameters of performance in commercial poultry flocks? For meat-type birds, performance parameters include:

- livability,
- fitness
- daily weight gain,
- feed conversion,
- condemnation rate at processing,

For breeder flocks, parameters mainly include:

- Livability
- fitness
- egg production rate,
- egg quality,
- fertility,
- hatchability,
- quality of the newly hatched birds

### Disease diagnosis

Undoubtedly, diseases have negative impact on the performance of poultry flocks, and so there is a merit in investigating any problem in a poultry flock to provide a diagnosis. Diagnosis means determining the disease. It can also mean determining the cause of a problem in a flock (e.g. poor growth). It is obvious that diagnosis is necessary for controlling a disease or problem in a flock and for preventing it from occurring in the future. Without knowing what the disease or the cause of the problem is, corrective and preventative actions may not be possible. Diagnosis of diseases in commercial poultry flocks is not always an easy task. It is true that some diseases are relatively easy to diagnose based on necropsy findings and/or results of laboratory tests, but some problems need in-depth investigation, determination, and patience. Occasionally, the problem comes and goes without one being able to determine its cause; these problems can be referred to as “unsolved or undiagnosed cases”. One must keep in mind also that the cause of some diseases or problems is still unknown or uncertain.

Diagnosis is a combination of skill science and not guesswork. For most of the poultry diseases that we know today, the diagnostic tools available to the poultry veterinarians generally allow for presumptive and definite diagnosis with a reasonable time. Under field conditions, a presumptive diagnosis in a day is much more important than a final diagnosis in a week. With thousands of birds in a confined space and in close contact with each other, and with multiple houses on the same farm, diseases (especially infectious diseases) can be explosive. Presumptive diagnosis will allow quick intervention to correct or control the problem and mitigate the economic loss. However, and whenever feasible, definite diagnosis should also be sought.

### Flock problem

When dealing with a health problem in a poultry flock, poultry diseases must be considered as diseases of a flock rather than of individual birds. Clinical signs in a few individual birds are usually an indication of a problem in the entire flock. To be a competent diagnostician, one would need both knowledge and skills. The following is a guideline for the diagnosis of diseases in commercial poultry flocks.

### 1. Obtaining a complete case history

In some cases, a clue to the cause of the problem can only be determined from the case history (e.g. toxicity caused by over medication or the use of incompatible drugs). How the clinical history is taken may make the difference between a correct diagnosis, no diagnosis, or a wrong diagnosis. The investigator should not hesitate to ask any question that he or she thinks is relevant to the problem in the flock. A simple, basic question may provide a clue to the cause of the problem in the flock. Poultry veterinarians should have the skills of asking the appropriate questions and to meaningfully interpret the answers to them. Clinical history includes:

- age of the birds,
- clinical signs,
- duration and onset of the problem,
- percentage sick,
- mortality record,
- when and where birds are found dead,
- weight for age at various stages of growth,
- egg production at different stages of production,
- feed and water consumption record,
- is the problem in more than one house?

### 2. Visiting the farm

In some cases, visiting the affected flock(s) may be necessary to observe clinical signs, number of birds affected, distribution of the birds on the floor, stocking density, feed and water system and other house equipment, availability of feed and water, house environment (ventilation, temperature, ammonia, dust, light), and litter condition

### 3. Defining the problem and its duration and severity

Now, one must determine the nature of the problem. In other words, what is the problem? Is it clinical signs, mortality, poor growth, drop in egg production, or changes in the egg quality (egg size, egg shape, shell quality)? The problem may be a combination of two or more of the above. If the flock shows clinical signs, then what are the clinical signs? (e.g. loose droppings, respiratory signs, neurological signs, changes in the eye, lameness / leg weakness, egg production problem, etc.).

#### 4. Obtaining additional information about the affected flock(s)

After defining the problem, it may be necessary to obtain additional information that includes but not limited to:

- history of any previous problem in the flock,
- history of a similar problem in previous flocks,
- vaccination record,
- type of feed and water source,
- medication during the last 14 days (in feed or water) including the dose or concentration,
- is the problem associated with a new load of feed?
- any disinfectant is or has been used to sanitize the water lines,
- any pesticide or herbicide is or has been used on the farm,
- management system and daily routine.

#### 5. Necropsy of birds

Necropsy is a very valuable diagnostic tool available to the poultry veterinarians. In many cases, presumptive diagnosis can be made based on necropsy findings and clinical history. For some diseases (e.g. vent pecking, cloacal prolapse, infestation with roundworms), necropsy can provide a final and definite diagnosis. Select a representative group of birds for examination. It is imperative that the selected birds reflect the disease problem. One should keep in mind that in most poultry diseases, not every bird in the flock is affected. Again, think of the disease as the disease of the flock and not of individual birds. If there are clinical signs and mortality, examine freshly dead birds, birds with little clinical signs, and birds with obvious clinical signs. Examine the birds externally before starting the necropsy; for example, check the birds for mite and lice infestation, injuries, lesion in the eyes, ocular and nasal discharge, and soiling or pasting of the vent with fecal materials.

Necropsy includes the following elements: systematic anatomical dissection of the bird, examination of organs and tissues, recognition of abnormalities (lesions) in organs and tissues, interpretation of the abnormalities, and correlating the abnormalities with the problem in the flock.

There is not right or wrong way to perform necropsy on birds, as long as the birds are examined carefully and thoroughly. In order to be consistent, one can develop a set order in which he or she examines the birds to ensure that all organs and tissues are examined. Clinical signs may indicate the need to examine organs or tissues with special care. Be gentle with the organs and tissues during necropsy, as useless pulling and cutting of organs may destroy or obscure lesions of diagnostic significance.

## 6. Laboratory tests

Samples may be collected for laboratory tests. The kind of samples that need to be collected and the laboratory test(s) to be requested depend mainly on the presumptive diagnosis and/or the abnormalities seen in organs and tissues during necropsy. Samples may be tested or stored for possible future use. It is critical that the samples are collected, handled, stored, and transported properly to keep them useful for laboratory tests. For the diagnosis of most diseases in poultry flocks, samples for laboratory tests usually include one or more of the following:

- tissues or swabs for the isolation of microorganisms or for PCR test,
- blood (serum) samples for serology,
- tissues for histopathology,
- blood or serum samples, tissues, and/or gastrointestinal contents for toxicology,
- feed and water for nutritional analysis or toxicology.

Because some laboratory tests are expensive, any requested laboratory test must be and justifiable, both scientifically and economically.

## 7. Formulating a diagnosis

Diagnosis of some diseases is like putting together the pieces of a jigsaw puzzle. Clinical history, necropsy findings, and the results of the laboratory tests are assessed and correlated. As mentioned previously, clinical history and necropsy findings will generally provide a presumptive diagnosis. Then it is the job of the poultry veterinarian to evaluate the results of the laboratory tests and correlate them with the clinical history and necropsy findings. The results of the laboratory tests may or may not support the presumptive diagnosis, and if not, then how can the test results be correlated with the clinical history and necropsy findings? In any case, it is now the time to gather all the information and put the different pieces together to formulate a final diagnosis. The final diagnosis may be definite or the best that can be provided. When the results of the laboratory tests are not conclusive, then the poultry diagnostician may have a short list of diseases or causes that he or she suspects. As mentioned previously, some cases may remain undiagnosed. Undiagnosed cases should not be a cause of disappointment but rather a challenge that may trigger further investigation and end up with reporting a disease that has not been reported previously. One must keep in mind that every disease of disease of chickens that we know today was new to someone, sometime, and somewhere. When all's said and done, the chicken producer is interested in one thing: how he or she can correct the problem and prevent it from occurring on his or her farm in the future.

# Diagnosis Poultry of Diseases is like a jigsaw puzzle

**Clinical history**

**Clinical signs**



**Postmortem findings**

**Lab tests**