

## Module – II:

Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers. Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

### POULTRY FEED MANAGEMENT

#### Introduction

India ranks 3<sup>rd</sup> in egg and 4<sup>th</sup> in broiler production. Balanced diet involves 70% of total production cost. Carbohydrates, Proteins, Fats, Vitamins, Minerals and water are the six major components of feed.

Feed of layers must include fat, quality protein having all the eleven essential amino acids besides Glycine as an additional amino acid. Fish meal, meat by-products, groundnut cake, sunflower cake, cotton seed cake, linseed meal, soybean meal are the rich sources of proteins. Calcium, Chlorine, Magnesium, Phosphorus, Potassium, Sodium and Sulphur constitute macronutrients while Cobalt, Copper, Fluorine, Iron, Iodine, Manganese, Molybdenum, Selenium, Zinc constitute micro nutrients. These are all essential for the construction of internal organs, blood cells, muscles and egg shells.

The primary objective of feeding poultry birds is to convert low quality feeds like cereal grains, oilcakes and other by products of agriculture and industry into high quality food like egg and meat.

#### Principles of feeding in poultry:

1. Chickens have neither lips nor teeth. They cannot chew the feed. Hence, their ration must have chief soft concentrates
2. Birds have simple stomach; hence requirements are more precise and specific.
3. Because of higher rate of metabolism, different feed for different Class of birds is required as per standards.
4. They are to be fed in groups.
5. Nutritional adjustments are to be done as they have higher rate of respiration and metabolism.
6. Feed must be free from aflatoxins
7. Clean, fresh and cool water must be made available at all

8. Birds feed must contain a maximum of 6 to 10% of crude fibre.

9. Feed requirements must be determined based on type of birds grown (chick/young/adult) and purpose for which it is grown (Meat or egg production)

10. Feed must be of balanced type having all essential nutrients

11. Records are to be maintained relating to the daily average feed

12. Water is most important supplement to the birds. If inadequate water is available birds cease eating

13. Quality of feed affects the consumption. Stale, rancid, moldy feeds are not eaten by birds. Some times such feeds cause diseases.

14. Poultry feeds may be in the form of Mash, Pellet or Crumble.

15. Type of Feed: Broilers are fed with Broiler starter (0-3 weeks), Broiler Finisher (4-8 weeks) till it is sent to market

16. Layer feed was traditionally divided as Chick feed (0-8 weeks), Grower Feed (9-20 weeks), Layer Feed (20-72 weeks). The feed given to Layers during Egg Laying Period is being divided now days as – **Phase I** (20-35 wk) is characterized by an increase in body weight to achieve mature body weight, increase in egg size and increase in egg number.

**Phase II** (35wk – 50wk) is characterized by an increase in egg size and maintaining peak egg production & body weight achieved in phase 1.

**Phase III** (50wk and above) egg size is increased but egg production and body weight are decreased.

#### METHODS OF FEEDING

A well balanced ration improperly fed will not give the most satisfactory result unless a satisfactory method is followed.

**Whole grain feeding system:** by this method birds are allowed to have their required ingredients kept them in separate containers. The system though permit birds to balance their ration according to individual needs, however, it appears doubtful. This old and abandoned system offers no particular advantage. While it entails the use of several feed hoppers and a considerable amount of time to keep them filled.

**Grain and mash method:** this method is slightly better than the previous one. it involves feeding of grain mixture along with balanced mash. By this, one can increase or decrease the protein level as desired.

Unless the poultry man is exceptionally skilled, the method will lead to bad performance.

**All mash method:** In this method of feeding, all the feed ingredients are ground, mixed in required proportion and feed as a single balanced mixture. This method is desirable for all types of poultry grown under litter and cage system. By this, birds cannot have the opportunity to have selective eating and moreover the quality of eggs produced are of uniform quality. However, ground feeds are not so palatable and do not retain their nutritive value so well as ungrounded feeds.

**a. Crumble:** It is a coarse variety of mash with a texture of oat meal. Crumble is a semi loose food. It fills the gap between mash and pellets

**b. Shell Grit:** This is the mixture of shells given to supplement calcium needs of birds. Chicks store the shell grit in their gizzard which helps in pulverizing the food for easy digestion

**c. Chicken Scratch:** It is a kind of treat for the flock. It consists mostly corn and other grains. It is given occasionally to change the regular diet. It is eaten happily by birds.

**d. Fermented feed:** To improve vitamin and enzyme content of the food fermented food is given occasionally

**e. Medicated feed:** Sometimes medicines are mixed to prevent diseases along with food.

**Pellet method:** Pellets are made of dry mash under high pressure. These are quite hard and cylindrical shape and are being extensively used in western countries. The greatest advantage in using pellets is that there is little waste in feeding. The disadvantage is that pellets are expensive- about 10% expensive than that of feed not pelleted.

**Restricted and controlled feeding:** This is further categorized as

**A. Quantitative restriction feeding method:** This method is practiced by limiting the amount of feed daily given to the animals. Here the quantity of feed is reduced below the normal requirements of birds.

This is done by various methods like

**(1) Skip a-day programme:** Feed is not provided for a day in a planned way. This controls obesity and fatty liver syndrome in broiler farming.

**(2) Alternate day feeding:** In this feed is provided on alternate days

**(3) Restriction of feeding time:** Feed available time is reduced. In this the continuous availability of the feed is reduced to 1 to 2 hours per day twice or thrice a day.

**(4) Physical Feed Restriction:** The space available for the bird at the feeder is reduced. Usually a bird requires 5 Centimeters of space at the feeder. By putting the feed in a smaller container which has feeding space lesser than 5 centimeters is called physical feed restriction method. This reduces the availability of the feed.

**B. Qualitative Restriction Feeding Method:** This method is practiced by reducing the quality of the feed below the standard requirement of the bird. This can be done by including feeds that are lesser in nutritive value. This will prevent obesity in birds.

### Advantages of Restricted feeding

1. A Considerable saving on feed cost.
2. Only 80% of the calculated feed requirement will be offered.
3. They are likely to consume less feed per dozen eggs even during lay period irrespective of the availability of the feed.
4. The pullets accumulate less fat and therefore produce more eggs.
5. It is easier to identify weaker birds at an early age during feed restriction. Culling of such birds helps not only saving feed but also promoting survival rate of the layers.
6. Layers fed, restricted during growing period has been found to produce heavier eggs than those fed at freely. .
7. **Uniformity of the sizes of Broilers/layers is very important aspect of poultry industry.** This can be achieved by the following precautions in Feeding Methods.

1. Receive chicks of uniform weight
2. Provide proper feeding, watering and floor space.
3. Change the feeder and drinker according to the age.
4. The height of the feeder and drinker should be at the back height of the bird.
5. Provide proper energy in the diet

- Sample weights of the pullets are taken at regular intervals and change the feed accordingly.
- Provide sufficient feeding space, thus facilitating the birds to consume feed simultaneously.

## VARIOUS INGREDIENTS OF POULTRY FEED/ NUTRITIONAL REQUIREMENTS OF POULTRY AT VARIOUS STAGES.

Poultry feeding is one of the important aspect of poultry science. Poultry feeds Chicken feeds shall be of Five types

- Broiler Starter Feed (BSF):-** It is Chick mash to be fed to chicks, intended for meat production, up to the age of 4 weeks.
- Broiler Finisher Feed (BFF):-** It is feed to be fed to chicks, intended for meat production, from the age of 6 weeks onwards till it is sent to market.
- Chick Feed (CF):-** it is feed to be fed to chicks, not intended for meat production, up to the age of 8 weeks.
- Growing Chicken Feed (GCF) :-** A ration to be fed to growing chickens from 8-20 weeks or until laying commences.
- Laying Chicken Feed (LCF) :-** A ration to be fed to laying birds from 20 weeks onwards or after laying commences. It is further devided into Phase I, Phase II and Phase III types of feed.
- Brooder Chicken Feed (BCF) :-** A ration to be fed to breeding chicken. (it is given in hatcheries, not at farm level usually)

Following are the nutrient constituents/  
Ingredients of poultry feeds

### Proteins

In poultry, the products produced consists mainly of protein. On a dry weight basis the carcass of an 8 weeks old broiler is more than 65% protein and the egg contents are about 50% protein. Typical broiler rations will contain from 22 to 24% protein and in layers ration the amount varies between 16-17%.

**Source of Proteins:** Meat scraps (lysine), fish meal (lysine, methionine), poultry by-product meal (tryptophan, lysine), cottonseed meal, peanut meal, soybean meal, sesame meal, sunflower seed meal etc.

### Carbohydrates

The main function of carbohydrates in the diet is to provide energy to the animal. The polysaccharides of major importance are starch, cellulose, pentosans and several other complex carbohydrates. Chicks can digest only starch. Cellulose is completely

indigestible. Cereal grains and their by-products are excellent source of starch and thus constitutes a bulk of poultry ration.

**Source of Carbohydrates::** Corn, sorghum grains (milo) barley, rye, oats, wheat, wheat middlings, various grain by-products.

## Requirements for Chicken feeds

S.No	Characteristic	Requirement for					
		BSF	BFF	CF	GCF	LCF	BCF
1	Moisture, percent by mass (max)	10	10	10	10	10	10
2	Crude Protein, percent by mass (max)	22	19	22	16	18	18
3	Crude fiber, percent by mass (max)	6	6	7	8	8	8
4	Acid Insoluble Ash, percent by mass (max)	3	3	4	4	4	4
5	Salt ( as NaCl), percent by mass (max)	0.6	0.6	0.6	0.6	0.6	0.6
6	Calcium, percent by mass (min)	1.0	1.0	1.0	1.0	2.75	2.75
7	Available phosphorus, percent by mass (min)	0.5	0.5	0.5	0.5	0.5	0.5
8	Lysine, percent by mass (min)	0.9	0.9	1.0	0.7	0.5	0.5
9	Methionine, percent by mass (min)	0.35	0.35	0.35	0.25	0.25	0.25
10	ME kcal/kg (min)	2900	3000	2700	2700	2700	2800

### Fats

Fats make up over 40% of the dry egg and about 17% of the dry weight of a broiler. Although fats supply concentrated form of energy (2.25 times more energy than carbohydrate and protein) their inclusion as true fats or oils in the ration is seldom practised because of high cost and the risk of rancidity which develops on prolong exposure to air, heat, sunlight, etc.

Most feed ingredients (maize, barley, safflower, milo, wheat, rice, bran, etc.) contain 2-5% fat and that is enough for the inclusion of one essential fatty acid (Linoleic acid),

**Sources of fats:** Animal tallow (beef), lard, corn-oil, other vegetable oils.

### Minerals

The body of the chicken and the egg excluding shell contain nearly 4 and 1% mineral matter respectively.

The elements known to be required in the diet of poultry are calcium, phosphorus, sodium, potassium, magnesium, chlorine, iodine, iron, manganese, copper, molybdenum, zinc and selenium.

Usually the grains and vegetable protein ingredients are relatively poor in mineral contents when compared with those of animal protein feed

stuffs. The common mineral supplements in poultry feed are as follows: -

- i. Limestone
- ii. Bone meal
- iii. Oyster shell
- iv. Sodium chloride
- v. Dicalcium phosphate
- vi. Manganese sulphate
- vii. Potassium iodide
- viii. Superphosphate.

**Source of minerals:** Meat scraps, fish meal, milk products, ground limestone (calcium), ground oyster shells (calcium), rock phosphate (phosphorus, calcium), steamed bone meal (phosphorus, calcium), salt (sodium, chlorine, iodine), manganese oxide (manganese), zinc carbonate (zinc), zinc oxide (zinc).

### Vitamins

Vitamins most commonly function as coenzymes and regulators of metabolism. The 13 vitamins required by poultry.

Apart from natural sources, commercial vitamin mixture suitable for poultry are also available. Diets continuously deficient in any one of the required vitamins will seriously tell initially upon the egg production and then the life of the chickens.

Source of vitamins: Yeasts, fish solubles, distillers' solubles, liver meal, alfalfa meal, milk by-products.

### Feed additives

Additives are never nutrients. They either singly or in combinations are added to a basic feed, usually in small quantities for the purpose of fortifying these with certain nutrients or stimulants or medicines. Often they are called "non-nutrient" feed additives.

Following are some modern feed additives used for poultry

#### A. Additives that promote feed intake or selection

1. Antioxidants BHT (Butylated hydroxytoluene) Santoquin: Ethoxyquin: BHA (Butylated hydroxyanisole);
2. Flavouring agents Poultry Nector
3. Pellet binders Sodium Bentonite (clay), liquid or solid by-products of the wood pulp industry, molasses, guar meal

#### B. Additives that Enhance the colour or quality of the marketed product

1. Xanthophylls, synthetic carotinoid, canthaxanthin

#### C. Additives that facilitate digestion and absorption

1. Grit; oyster shell, limestones, gravel and pebbles
2. Chelates :EDTA
3. Enzymes Agrozyme, Diazyme, Zymopabst, Prozyme and Avizyme.

4. Probiotics; strains of lactobacillus and streptococcus.

5. Antibiotics ; penicillin, streptomycin, tetracyclines, aureomycin

#### D. Additives that alter metabolism

1. Hormone Progesterone , Dienestrol diacetate.

#### E. Additives that affects health status

1. Antifungal additives: sodium propionate, sodium benzoate, quaternary ammonium compounds
2. Anticoccidial: Bifuran supplement, Amprol 25%, Embazin, Zonamix, Nitrofurazone, Furazolidone.
3. Anthelmintic drugs: Mebendazole

Chick ration	
Ingredient	% composition
Maize	30
Wheat	20
Wheat bran	10
Rice bran	10
Sunflower cake	10
Cotton seed cake	5
Fish meal	2
Beans	10
Bone meal	1
Limestone	0.5
Salt	0.5
Mineral premix	1
	<b>100</b>

Grower rations	
Ingredient	% composition
Maize	25
Wheat	25
Wheat bran	15
Rice bran	10
Sunflower cake	5
Cotton seed cake	11
Fish meal	2
Beans	5
Bone meal	1
Limestone	0.5
Salt	0.5
Mineral premix	1

Layer ration	
Ingredient	% composition
Maize	35
Rice bran	35
Soya cake	10
Fish meal	15
Limestone	2
Ground dried Legume leaves	3.5
Salt	0.5
Mineral premix	1
	<b>100</b>

## **POULTRY DISEASES**

India's poultry industry represents a major success story. While agricultural production has been rising at the rate around 2 percent per annum over the past two to three decades, poultry production has been rising at the rate of around 8 percent per annum

Most complicated aspect of poultry farming is the problem of diseases and their control. Various diseases that affect poultry industry are classified as follows

### **1. Diseases caused by Pathogens**

**Viral Diseases:** New Castle Disease, Gumbora, Avian Influenza, Fowl pox, Infectious bronchitis etc.  
**Bacterial:** Fowl Cholera, Salmonella, Mycoplasma, Rimerella etc.

**Fungal Diseases:** Aspergillosis, Mould, Mycotoxins

**The Protozoa and other kinds of parasites:**

Coccidiosis, Intestinal worms, Lice and Mites

### **2. Metabolic and Nutritional diseases**

These are the conditions caused by a disturbance of normal metabolic functions either by genes or nutritional problems. These include Fatty Liver syndrome, Cage layer fatigue etc.

### **3. Behavioural diseases**

Abnormal behaviour patterns lead to ill health of the birds. These include aggressive pecking, Cannibalism etc.

## **VIRAL DISEASES**

### **1. Ranikhet Newcastle Disease ND**

#### **Cause**

Newcastle disease is caused by a Paramyxovirus (APMV-1).

#### **Transmission**

Newcastle disease virus is highly contagious through infected droppings and respiratory discharge between birds. Spread between farms is by infected equipment, trucks, personnel, wild birds or air. The incubation period is variable but usually about 3 to 6 days.

#### **Species affected**

Chickens and turkeys.

#### **Clinical signs**

Highly pathogenic strains of ND cause high mortality with death within 3 to 5 days. Affected chickens usually exhibit respiratory or nervous signs.

Labored breathing with wheezing and gurgling, accompanied by nervous signs, such as paralysis or twisted necks are the main signs.

Drop in egg production 30 to 50 % or more, In well-vaccinated chicken

flocks clinical signs may be difficult to find.

Intestinal lesions Inflamed tracheas, pneumonia, and/or froth in the airsacs are the main lesions. Haemorrhagic lesions are observed in the proventriculus and the intestines.

#### **Diagnosis**

Clinical signs followed by laboratory confirmation. Because other respiratory infections like IB, ILT and AI can give similar signs.

Confirmation can be obtained with virus isolation and identification through PCR test

#### **Treatment**

There is no specific treatment for ND; antibiotic treatment of secondary bacterial infections (eg E.coli) will reduce the losses.

### **2. Marek's Disease MD or Neuro Lymphomatosis**

#### **Cause**

Marek's disease is caused by an alphaherpesvirus.

#### **Transmission**

The disease is highly contagious. Main transmission is by infected premises, where day-old chicks will become infected by the oral and respiratory routes. Young chicks are particularly susceptible to infection.

#### **Species affected**

Especially chickens, also quail, turkeys and pheasants are susceptible.

#### **Clinical signs**

Infected birds show weight loss, or may exhibit some form of paralysis.

The classical form: neurolymphomatosis (paralysis) with leg nerve involvement causes a bird to lie on its side with one leg stretched forward and the other backward.

Acute Marek's disease is an epidemic causing paralysis, mortality and tumours in multiple organs.

Mortality usually occurs between 10 and 20 weeks of age and can reach up to 50% in unvaccinated flocks.

#### **Diagnosis**

The presence of tumours in liver, spleen, kidneys, lungs, ovary, muscles, or other tissues is indicative of MD. However, nerve involvement (swelling of nerves) is typical of MD.

A proper diagnosis requires histological examination or PCR test

**Treatment** There is no effective treatment for affected flocks.

## **Control**

Vaccination is an effective means of control.

It has been demonstrated that MD vaccine only prevents the appearance of Marek's disease tumours and paralysis. It does not prevent the birds from becoming infected with MD-virus.

It is therefore of major importance to maintain high hygienic and sanitary measures by good management to avoid early exposure of young chickens.

## **3. Infectious Bronchitis (IB)**

### **Cause**

Infectious Bronchitis (IB) is present worldwide, it is a highly contagious, acute, and economically devastating disease. IB is caused by an Avian Coronavirus.

### **Transmission**

The virus is transmitted rapidly from bird to bird through the airborne route. The virus can also be transmitted via the air even from farm to farm. The incubation period is only 1-3 days.

### **Species affected**

Chickens are the primary poultry species that is susceptible to IB-virus,

### **Clinical signs**

In young chickens the respiratory form appears with gasping, sneezing, tracheal rales and nasal discharge. Generally chicks are depressed and show reduced feed consumption. Mortality in general is low unless infection gets complicated with secondary bacterial infections (like E.coli).

In adult "laying" birds (layers and breeders) after initial respiratory signs the affected flocks show a drop in egg production and a loss of egg quality (shell deformation and internal egg changes)

Post mortem lesions

In young chicks a yellow cheesy mass at the tracheal bifurcation is indicative of IB infection. mucus and redness in the trachea, exudate in the air sacs and swollen kidneys, ovaries are seen.

### **Diagnosis**

Clinical signs and post mortem lesions in a flock followed by laboratory confirmation based on virus isolation and identification with PCR.

### **Treatment**

There is no treatment for IB. Antibiotics are used to control secondary bacterial infections.

### **Prevention**

Vaccination with strain specific or cross protective live vaccines, and for layers and breeders.

## **4. Fowl Pox or Avian Pox, Avian Diphtheria)**

### **Cause**

Fowl pox is caused by a Poxvirus.

### **Transmission**

Transmission occurs by direct contact and water or feed.

Mosquitoes and other flying insects can also transmit the virus from bird to bird and also transmit the disease to near-by flocks.

The incubation period varies from 4 to 20 days.

### **Species affected**

Chickens, turkeys, pheasants and pigeons can be affected

### **Clinical signs**

The lesions of fowl pox can be external (mainly on the head) or internal ("wet pox") in the oral cavity, oesophagus and/or trachea; The lesions on the head, combs, and wattles are usually wart-like in appearance, yellow to dark brown in color.

The internal lesions (diphtherie) in the mouth, oesophagus and/or trachea are yellow-white and cheesy in appearance. Affected birds will lack appetite and breathe laboriously.

Mortality is variable, from 2%, to over 40% Reduced egg production can be observed in laying birds, this will return to normal in a few weeks.

### **Diagnosis**

Wart-like lesions of the head particularly of the comb and around the eyes or yellow cheesy lesions of the mucous membranes of the nasal and oral cavities are suggestive of fowl pox.

A definitive diagnosis can be made in a laboratory by histological examination or virus identification through PCR

### **Treatment**

There is no effective treatment.

### **Control**

Preventive vaccination using a live vaccine is by far the most successful control method. Even when an outbreak of Fowl Pox has been diagnosed, it is advisable to vaccinate the flock immediately (emergency vaccination) to stop further spreading of the infection.

## **5. Infectious Bursal Disease (Gumboro disease, IBD)**

### **Cause**

The disease is caused by a Birnavirus

### **Transmission**

IBD virus is very infectious and spreads easily from bird to bird by way of droppings. Infected clothing and equipment are means of transmission between farms.

### **Species affected**

Chickens and turkeys appear to be natural hosts.

### **Clinical signs**

Clinical IBD occurs usually between 3 and 8 weeks of age. Affected birds become pale and produce watery white diarrhea. Mortality varies from 5 to 60%.

### **Diagnosis**

Typical clinical signs and post mortem lesions are found after IBD infection.

Post mortem lesions; in acute cases the bursa of Fabricius is enlarged and gelatinous, sometimes even bloody. Muscular hemorrhages and pale kidneys can be seen.

The bursa destruction is apparent on histologic examination.

Histopathological examination, serology, virus isolation and PCR are confirming tools. IBD can be confused with sulfonamide poisoning, aflatoxicosis, and pale bird syndrome (Vitamin E deficiency).

### **Treatment**

No treatment is available for IBD.

### **Control**

Vaccination of breeders and young chicks is the best means of control.

A variety of live and inactivated vaccines have been developed to enhance the control of IBD challenges.

## **BACTERIAL DISEASES**

### **1. Infectious Coryza**

#### **Cause**

This is a bacterial disease caused by *Avibacterium paragallinarum*, (in the past known as *Haemophilus paragallinarum*).

#### **Transmission**

The disease spreads from bird to bird and flock to flock by contact and airborne infected dust particles and via the drinking water. Spread by equipment and personnel have also been reported. The incubation period varies from 1 to 3 days.

#### **Species affected**

The chicken is the natural host for *Avibacterium paragallinarum*. All ages are susceptible.

### **Clinical signs**

The main clinical signs are due to an acute inflammation around the eyes and upper respiratory tract. Signs include a serous to mucoid discharge in the nasal passage and sinuses, facial edema and conjunctivitis. Loss of weight in broilers and loss of egg production in layers occurs.

### **Diagnosis**

The symptoms of Coryza disease are common to many diseases. Hence thorough inspection of the clinical signs by isolating the bird is to be done. Air Sac Exudate is to be obtained and tested in laboratory.

### **Control:**

Eradication is not economically feasible. Control by best biosecurity methods.

### **Treatment**

Treatment with various antibiotics (erythromycin and tetracycline are commonly used) will alleviate the severity and course of the disease.

Relapse often occurs after treatment is discontinued and recovered birds will remain carriers.

### **Prevention**

Vaccination is the preferred control method and is standard in most Coryza endemic areas.

## **2. Pullorum disease (Bacillary White Diarrhoea) and Fowl Typhoid (Salmonellosis)**

#### **Cause**

Pullorum disease is caused by a bacterium, *Salmonella pullorum*. Fowl typhoid is caused by *Salmonella gallinarum*, which is related to, but not identical to *S. pullorum*.

#### **Transmission**

Pullorum and typhoid can be transmitted horizontally and vertically by infected (carrier) breeder hens through their eggs. Infected chickens can also infect other chicks via droppings. Fowl typhoid is more a disease of adult chickens, with high mortality. Horizontal transmission is important with fowl typhoid through infected droppings, dead bird carcasses, and infected clothing, shoes, utensils and other fomites.

#### **Species affected**

Chickens and turkeys. Other birds such as quails, pheasants, ducks, peacocks and guinea fowl are susceptible.

#### **Clinical signs and lesions**

Birds hatched from *S. pullorum* or *S. gallinarum* infected eggs appear

lazy or dead in the hatching trays and the young birds will show weakness, depressed appetite, poor growth and increased mortality.

In older birds depression, diarrhea, ruffled feathers, pale shrunken combs and mortality. Mortality can reach 25-60%

Lesions; acute septicaemia-enlarged and congested liver, spleen and kidneys, Heart is seen

### **Treatment**

Treatment with antibiotics of pullorum/fowl typhoid disease will not cure but reduce clinical signs. It is far more practical to control the disease by elimination of infected carrier breeder hens. Blood tests of breeder are done to identify the infection and such breeder should be culled.

For layers vaccines against fowl typhoid are available.

## **3. Fowl Cholera (Avian Cholera, Pasteurellosis, Avian hemorrhagic septicaemia)**

### **Cause**

Fowl cholera is caused by a bacterium: *Pasteurella multocida*

### **Transmission**

Transmission of fowl cholera is mainly from bird to bird by water or feed contamination. There is no evidence for egg transmission.

### **Species affected**

Turkeys, chickens, ducks and geese, game birds and other bird species are susceptible.

### **Clinical signs and lesions**

Affected birds have decreased appetite. Egg production will drop 5-15 % and mortality will be high in acute fowl cholera. Birds that die from acute fowl cholera frequently have bluish combs and wattles. Swollen wattles is a feature of chronic fowl cholera.

Lesions; acute phase septicaemia in viscera, hemorrhages, swelling in liver and ovaries. In Chronic phase; localized infections in conjunctiva, facial edema, middle ear infection resulting in

### **Diagnosis**

Clinical signs in combination with isolation and identification from samples from birds that died of acute Fowl cholera. (Fresh death birds)

### **Treatment**

Antibiotics based on antibiotic sensitivity test, the earlier the diagnosis the better chance of a positive effect of an antibiotic treatment.

## **Control**

Hygiene management and rodent control to be undertaken. Vaccination can be considered in areas where *Pasteurella multocida* is prevalent.

## **4. Colibacillosis Cause**

Bacterial infection with avian pathogenic *Escherichia coli* (APEC). It is estimated that 10-15% of the intestinal coliforms are potentially pathogenic. Infection can be primary or secondary after primary host defense damage (eg respiratory viral infections, *Mycoplasma* infections, parasites, wounds etc).

## **Transmission**

*E. coli* are normal intestinal inhabitants and are shed via direct or indirect contact and feces. Egg transmission (via egg surface contamination) is also common. House flies and beetles can also spread *E. coli*.

## **Species affected**

Chickens and turkeys, most avian species are susceptible.

## **Clinical signs and lesions**

Retarded growth, increased mortality, reduced feed and water intake are common signs. Lesions: colisepticaemia, Bone swelling, meningitis like symptoms are shown. Mortality are very variable.

## **Diagnosis**

Clinical signs in combination with isolation and identification.

## **Treatment**

Antibiotics based on antibiotic sensitivity test.

## **Control**

Hygiene management, hatching egg management and *E. coli* vaccination is available.

## **5. Infectious Synovitis Cause**

Is a clinical condition caused by different possible agents: *Mycoplasma synoviae*, *Staphylococcus aureus*, and certain reoviruses. *Staphylococcus* infections are common in poultry

## **Transmission**

Infections generally occur after the breakdown of natural defense mechanisms, due to mechanical damage (eg wounds) or infectious breakdown of the immune system (eg CAV, IBD, Marek's Disease).