

ASCITES – Fear Psychosis in Broiler Industry

Dr B C Dutta

Ascites is number one negative contributory factor in broiler business in this part of the world with open farming system during last decades. The Ascites may be found in varying degrees from July to February every year but Jan – Feb is really challenging.

The contents of the article are based mainly on the field experience of a poultry veterinarian during last 10 years in India, Nepal & Bangladesh enriched by inclusion of published research & books by eminent scientist.

Definition

Ascites, commonly known as **Water Belly** is not a disease but a syndrome when fluid accumulation occurs in abdominal cavity.



The disease was first reported from broiler raised in high altitudes of Bolivia, south America in 1968 and was due to Hypoxia, lack of sufficient Oxygen supply in inhaled air. During last 25 years Ascites is reported every year with increasing trend from planes which is correlated with genetic & nutritional improvement leading to very first growth rate & feed efficiency.

Why in Broiler only?

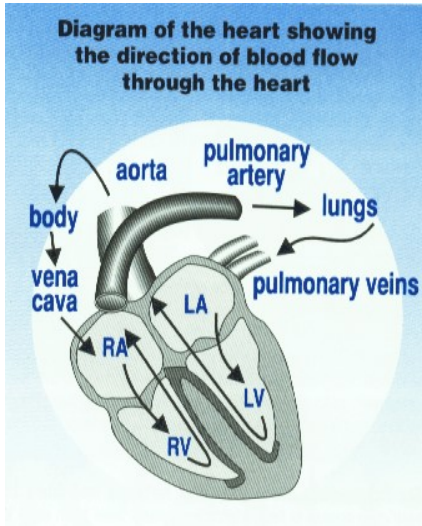
Broiler chicken grows very fast with high feed efficiency & breast meat yield which requires high O₂ demand. The metabolic rate of broiler is very high and thus there is every chance of imbalance between O₂ supply & O₂ required to sustain the rapid growth rate.

Moreover, modern broiler has smaller lungs (Genetics has increased the meat volume of broiler chicken but lungs remains same) which make it vulnerable to Hypoxaemia, deficiency of O₂ in the blood leading to Ascites.

Development of the Syndrome:

We need to know about the avian heart before entering into the development of the syndrome. The heart is cone shaped, longer & narrower with 4 chambers, left & right atrium and left & right ventricle.

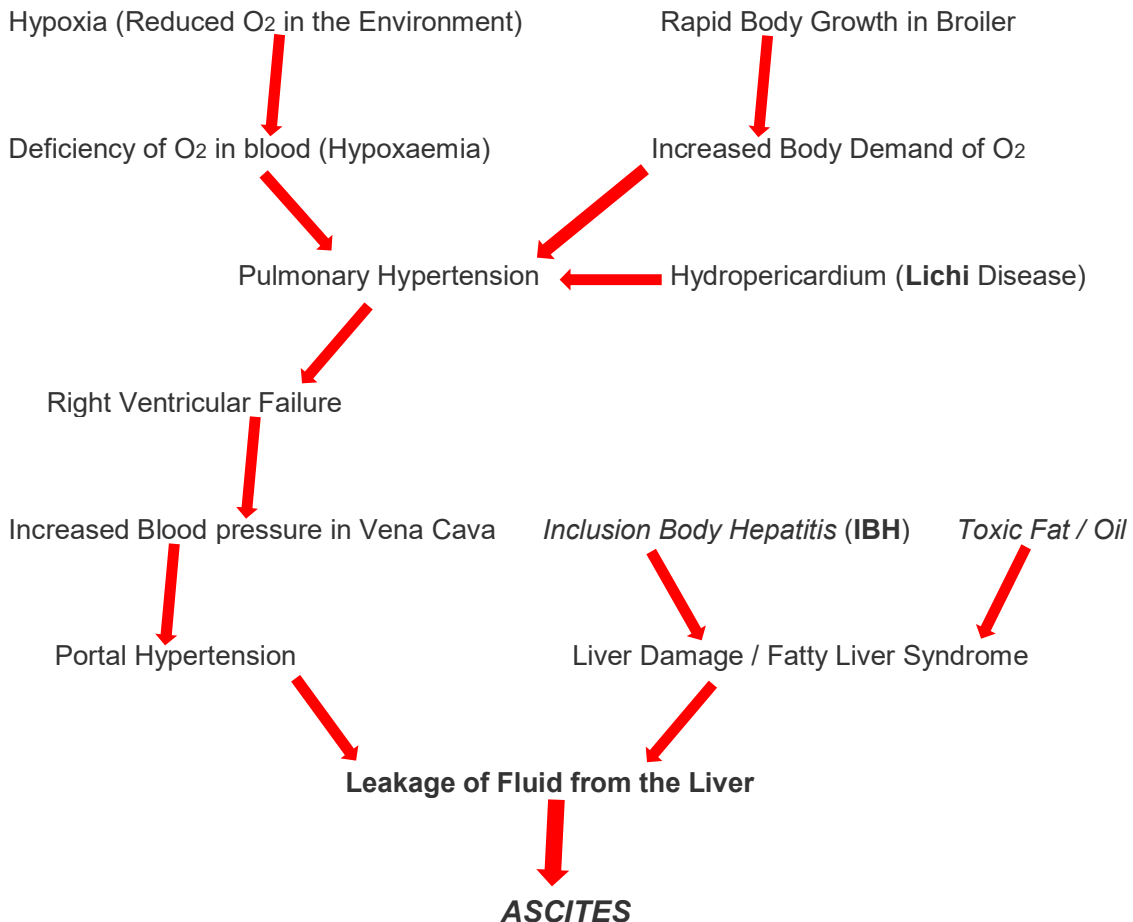
The atrium acts as a receiving chamber and ventricle as a pumping chamber. The right ventricle of bird is relatively thin walled & shorter than left one. The right ventricle meant to work as volume pump which means it responds quickly to increased workload and becomes thickened, dilated & enlarged. The valve between atrium & ventricle also thickened under work pressure as in case of pulmonary hypertension which leads to the failure of the valve (Valvular insufficiency) who may not close properly when ventricle contracts to release the



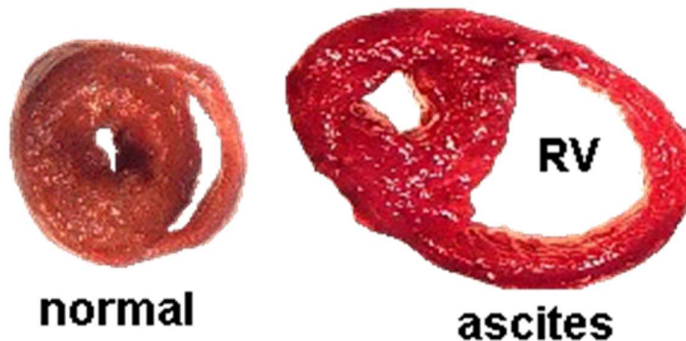
blood resulting the broiler chicken very much prone to right ventricular failure (RVF).

There is some unique difference present in avian respiratory system:

- Lungs are tightly fitted in the thoracic cavity and can't expand like mammals when more O₂ is needed.
- The capillaries in avian lungs have restricted space for blood flow because they dilate very little.
- The lungs grow very slowly compared to muscles with age.



On contraction blood flows from right ventricle to lungs via pulmonary artery. Under condition of demand supply mismatch either due to reduced O₂ in inhaled air or due to Excess demand or due to both together, the heart tries to pump more blood into the lungs in an attempt to meet the high O₂ requirements, it puts an extra load on right ventricle. Further, when heart unable to pump normal blood continuously due to abnormal situation like Hydropericardium, puts extra pressure on ventricles. Moreover, back pressure is build up due to resistance from lungs to blood flow, the blood pressure within the pulmonary artery rises. This phenomenon is called as **pulmonary hypertension**. To overcome this high pressure, right ventricle tries to pump more forcefully, and become thickened, dilated & enlarged and fails to pump adequately. This is right ventricular failure (**RVF**) when right ventricle may even double of normal size.



This is followed by thickening of right (AV) atrio-ventricular valve, which fails to close the valvular opening properly (**Valvular Insufficiency**) resulting back flow of blood into atrium with each heartbeat. Due to back flow pressure increases in vena cava leads to **portal hypertension**, the increase in blood pressure within hepatic veins, which carries impure blood from liver to vena cava. There is a gradual increase in blood pressure in both hepatic & portal veins and further within the blood vessels (sinusoid) of liver. Due to the increased pressure inside the sinusoids, there is leakage of plasma through the surface of liver into the abdominal cavity resulting development of Ascites. The most important factor is **an extremely high metabolic demand of Oxygen by the tissues due to rapid growth in modern broiler**, coupled with restricted blood flow through capillaries of the avian lungs.

Contributing Factors:

- Genetic nature of modern broiler chicken; more genetic potential for muscular growth than to supply Oxygen to sustain the growth.
- High Altitude
- Oxygen vs Carbon di oxide ratio in the poultry house environment
- Respire-able dust in poultry house
- Reduced environmental oxygen inside hatcher immediately after hatching

- High energy pelleted feed of modern broiler
- Overcrowding.

Etiology:

- Poor Ventilation during brooding; insufficient air circulation inside poultry house
- Low Temperature brooding forces the birds to use more energy (which requires O₂) to maintain body temperature



- High Litter Ammonia irritate the lungs, resulting in decreased O₂ transfer between bird & environment
- Gas Brooder or Coal Bukhari causes high CO in brooder house resulting poor O₂ transfer between bird & environment
- Sodium toxicity leading to pulmonary hypertension resulting ascites
- Aspergillosis, a fungal disease damages the lungs badly reducing efficiency of air inhalation resulting ascites
- **Inclusion Body Hepatitis (IBH)**; a viral disease where liver become enlarged & fat globules deposits in between hepatic cells leads to damage of sinusoids resulting ascites.
- Toxic fats or rancid oils cause damage of liver leading to ascites

Symptoms:

- Ascites shows like sudden death
- Affected Broiler grows slowly
- Dull & depressed
- Ruffled feathers
- Pale head & shrunken comb with loss of shining of feather



- Severely affected birds show abdominal distension. Abdominal skin may be red and/or bluish (cyanotic) appearance.
- Reluctant to move
- Difficult breathing, even panting

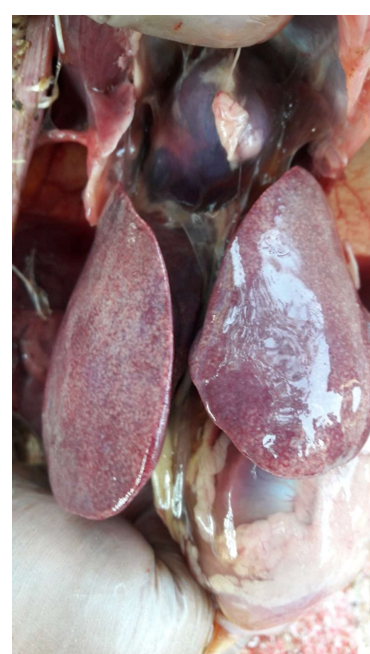
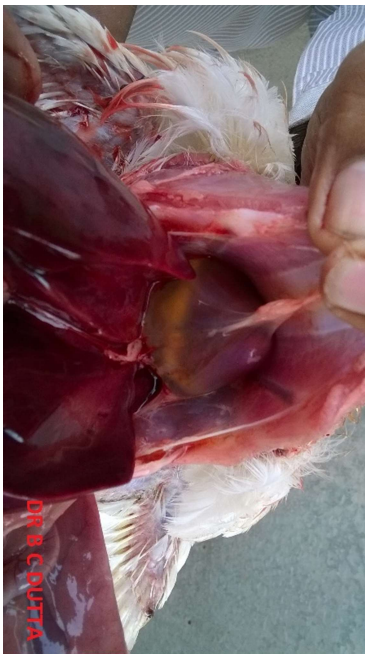
- Mortality is very high especially after 28 days (daily 1-2% mortality) which may even go up to 25%.

Post Mortem Findings:

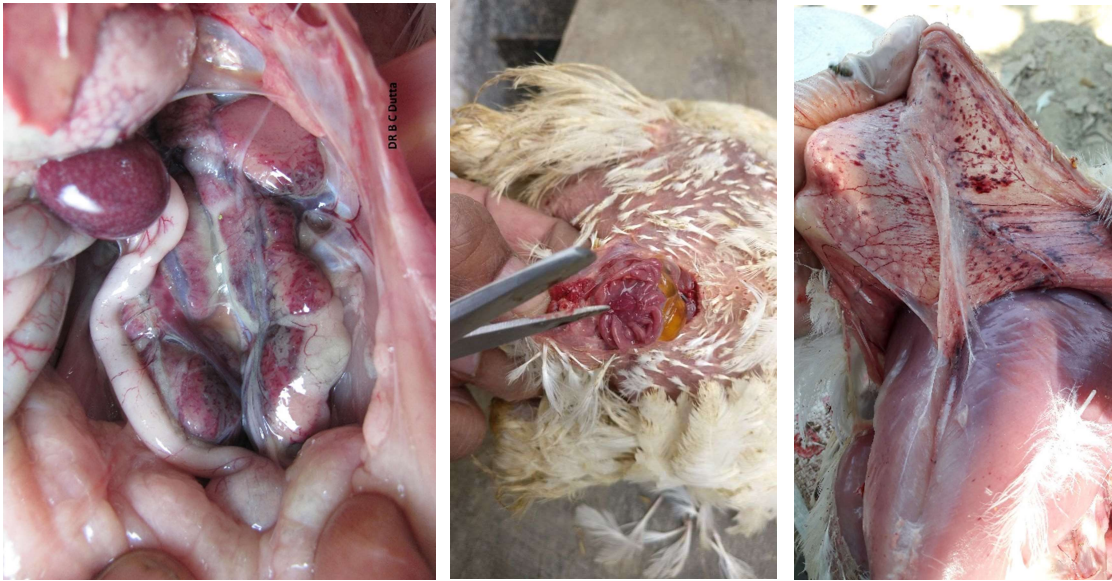
- A large amount of fluid in peritoneal cavity; colour of which may be clear to straw-colour to yellowish to reddish with blood tint.
- Heart is covered with white fluid in case of Hydropericardium (Lichi Disease)



- Dehydrated body with skin tightly attached with muscular structure.
- Liver is enlarged, congested with numerous pink or red or white pin point spots all over. Liver is haemorrhagic and profuse blood comes out if cut with scissor in case of acute IBH. Most cases liver is fatty and fragile; like rotten fats of meat on pressure.
- Kidney shows congestion with haemorrhagic spots in case of IBH
- Heart is enlarged, especially the right ventricle which is palpable (Normally solid)



- Bursa affected in IBH/ Hydropericardium: size from small atrophied to highly enlarged. In most cases contain pus like secretion, sometime gelatinous white flakes. Haemorrhagic internal surface is very common.



- Spleen enlarged & haemorrhagic

Diagnosis: Diagnosis of Ascites is based on typical post-mortem findings

Treatment:

There is no treatment of ascites, once birds develop the condition, death occurs rapidly. Frusemide, a diuretic help reducing mortality by reducing fluid & electrolyte retention and by reducing pulmonary vascular resistance through dilatation of blood vessels. Vitamin C, Vit E & organic Selenium also reduces mortality through their anti-oxidant activity. Because oxidative stress & free radical formation are involved in development of ascites.

Control:

- i) **Prevent Chilling** or Exposure to cold during first 2 weeks of life. Avoid early morning cold stress during winter months



- ii) **Ensure adequate Ventilation.** Today's broiler need huge oxygen for respiration and metabolic activity to handle its growth potential through genetics & high energy feed. During winter months due to closed environment of broiler brooding

house, oxygen concentration at chick's level is prone to be less which is basic reason of ascites in later stage of life.

Never compromise with ventilation whatever may be the climate temperature. Curtain shall be hanged in such a way so that both side of the house remain open at least 6 inches on top for removal of toxic gasses like CO, CO₂. To make the brooding house temperature at chick's comfort level during winter use of Gas or Electrical Heater, Coal or Wood Oven are common. The CO₂ from chick's respiration & heat source and CO from Coal or wood Oven need to go out continuously and fresh air has to go inside to maintain ventilation.

- iii) **Prevent Entry of Viral Disease like IBH & Hydropericardium** by effective & dedicated Biosecurity, avoiding Stress to newly hatched chicks and Breeder & Broiler Vaccination. Vaccination against IBH is not much successful so far
- iv) **Avoid Ammonia & Dust in poultry house.** They are major lung irritants & damage the lungs resulting development of ascites. Litter management & ventilation are major factors contribute ammonia development in poultry house.
- v) **Environmental Temperature, Humidity & Air Circulation** across birds shall be controlled to prevent excessive body heat loss
- vi) **Sodium** concentration in feed should remain under control. Excess sodium leads to pulmonary hypertension. Unnecessary use of sodium in water shall also remain control.
- vii) **Minimize Toxin contamination in Feed**
- viii) **Lighting Program;** intermittent lighting with increasing photoperiods helps reducing ascites without affecting broiler performance.
- ix) **Ascites can be controlled by Feed Restriction during 7 to 21 days of life.** But feed restriction is detrimental to overall growth & immunity development of modern broiler and is not advisable in modern farming scenario.
- x) **Use of Mash Feed help reducing ascites.** But Mash feed has its own limitations.
- xi) Increase **Vitamin E & organic Selenium** level in diet reduces mortality due to ascites due to their antioxidant activity.