

# Ascites Poultry

## Abstract

Poultry has reached a high level of development and thus become one of the most dynamic areas of agriculture. Very few countries are still without a successful poultry production and poultry is the main protein feed of animal origin for human consumption. Success in poultry production is the result of genetic selection, proper nutrition and health care. The presence of bacteria, mycoplasmas, viruses and parasites has limits the production potential and leading to increased mortality rate, which has been accepted as normal technology. Time to develop a health management system, and with the use of prophylactic vaccination, antibacterial and antiparasitic drugs today are not expected mass occurrence of diseases caused by these agents.

Given the ability to control the majority of bacterial and parasitic diseases, it is obvious that the most serious problems of poultry production causing technopathy that include and metabolic disorders. General mortality which is caused by metabolic disorder, is the most present in the fast growing of birds, and in those with a high bearing capacity. Ascites constitutes 30% of all mortality, caused as a consequence of metabolic diseases.<sup>1</sup>

**Keywords:** poultry, ascites, fluid

Volume 1 Issue 2 - 2014

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**Received:** July 28, 2014 | **Published:** September 03, 2014

## Ascites (hypertrophy of the right ventricle, pulmonary hypertension, water belly)

Ascites is characterized by an accumulation of fluid in the cavity grudnotbusnoj caused by a number of processes related to the need to ensure a high level of oxygen in the tissues. It can occur in broiler chickens, turkeys, guinea fowls and ducks.<sup>2</sup> It is most common in male broilers held at high altitude and in those who were exposed to the colder weather. In extreme conditions, the death rate up to 25%, although it is frequently 5 to 12%.<sup>3</sup>

Broiler chickens have a high demand for oxygen which is required as fuel for the metabolic processes. When the request to extend the accelerated growth rate, then the lungs require more oxygen. In order to meet the need for oxygen in poultry is a greater flow of blood through the lungs, which act as an additional stress on the right ventricle of the heart. Under physiological conditions, the right ventricle of the heart is relatively small, but in the case of ascites was markedly wider than normal. Thus weakened chamber creates a negative pressure on the various supply systems, which results, leakage of plasma from the liver. Arterial blood pressure was increased twice.<sup>2</sup>

## The etiology of ascites

Ascites is a multifactorial etiology, which indicates the complexity of the prevention and suppression of this disorder.<sup>4</sup>

### Etiological factors that may cause ascites

- i. Capillary endothelial damage which is caused by action of toxic substances such as: diotoksin, phenol, furazolidone. Furazolidone previously used in poultry and its application in poultry by us is prohibited.
- ii. Septikemic various conditions caused by bacteria and bacterial toxins that can damage the blood vessels with consequent release of plasma into the surrounding tissue.
- iii. Increase vascular hydrostatic pressure, which stimulates the re-

lease of fluid from blood vessels, is a common cause of ascites in heavy breed chickens and ducks due to damage to the right heart valve and the right ventricle as a result of hypertension.

- iv. Reduce vaskularmog koloidoosmotskog pressure leading to ascites, because there is not enough protein to keep the water bound for myself, and free water out into the surrounding tissue.
- v. Poor ventilation results in increased ammonia concentrations that lead to lung damage with subsequent hypoxia.
- vi. Overpopulation space leads to hypoxia due to inadequate concentration of oxygen in the air.
- vii. A vitamin E, vitamin C and selenium, which allows harmful effects of free radicals in the blood vessel walls.
- viii. sodium intoxication, which leads to the deposition of salt crystals in the kidney, resulting in the occurrence of ascites.
- ix. Erucic acid rapeseed degenerative effect on the cells of heart infarction, and thus hinders the work of the heart.
- x. Stress occurs at high or low temperatures, due to overcrowding in the facility, during transport, vaccination coverage of individuals. As a result of stress leads to an increase in blood pressure, and to the increased heart rate, which results in the damage of blood vessels.<sup>1</sup>
- xi. Keeping the birds at high altitudes, although ascites occurs at all altitudes-Stay birds at high altitudes causes of secondary polycythemia, in which the increased viscosity (density of blood), leading to its slow flow and hypoxia.
- xii. Mikotoksikoze lead to damage to the liver, which does not synthesize sufficient albumins and other blood proteins.

## The pathogenesis of ascites

Broilers consume a lot of food and grow very quickly and therefore have an increased need for oxygen. When the increased need for

the heart to pump oxygen maximum amount of blood to the lungs. Pulmonary hypertension occurs when the heart is unable to pump sufficient amounts of blood flow through the lungs and as a result, come hypertension. The lungs of birds and lung capillaries have very little ability to spread. The volume of the lungs and cardiovascular system lung is fixed, after some time, the lungs will not be able to receive blood that came from the heart and it is the starting point of heart failure. Excess blood pumped to the lungs will go back through the heart to the liver and intestine. The heart will increase over time due to increased work and pressure. As a consequence of the departure of excess blood to the liver and intestines, blood vessels of the chap will become enlarged and very prominent. As a result there is, leakage "of plasma from blood vessels."<sup>5</sup>

Higher concentrations of ammonia than the allowable damage the lungs so it can irritate the blood vessels of the lungs, which results in the occurrence of bleeding in the lungs and the inability to supply optimal amounts of oxygen, which results in hypoxia.<sup>6</sup>

Stress occurs at high or low temperatures, due to overcrowding in the facility, during transport, vaccination coverage of individuals. As a result of stress leads to an increase in blood pressure, and to the increased heart rate, which results in the damage of blood vessels. From the blood vessel comes blood plasma (liquid), which accumulates in the thorax-abdominal cavity. Stress level is established by measuring cortisol levels, which is a stress hormone. Cortisol acts immunosuppressive, and the individual more susceptible to disease. Vitamin C stimulates the adrenal a complex of a cell, reduces the secretion of cortisol. To maintain optimal body temperature is needed oxygen. Termoneutralna temperature for complete operjale chick is 24°C. This is the temperature at which the birds do not have to be used for the creation of the energy of the radiation heat. When the temperature deviates from the above, the birds have to use energy to release or to create heat. The greater the need for oxygen when the temperature deviates in the direction of lowering.<sup>1</sup> Stay birds at high altitudes causes of secondary polycythemia, which is a physiological response to decreased bone marrow tissue oxygenation that occurs as a result of the low partial pressure of oxygen in the ambient air. Secondary absolute polycythemia polycythemia as plasma volume and the hematocrit is not reduced is increased above 70%. For secondary polycythemia the pathognomonic finding of elevated concentrations of erythropoietin in serum. The increased viscosity (density levels), which leads to its slow flow, reducing the concentration of hemoglobin oksigenisanog, and an increase in the concentration of deoxyhemoglobin. When deoxyhemoglobin concentration exceeds 50g/l, there is cyanosis (blue staining) of the skin and mucous membranes. The condition of the organism of hypoxia responsive sensory cell wall capillaries in the kidney so that after only one to two hours to give rise to increased concentrations of erythropoietin. Erythropoietin stimulates erythropoiesis, which results in the creation of a large number of red blood cells. Target organ effects of erythropoietin is Kosna core, which is the main organ of erythropoiesis. Ertiropoetin binds to the receptors for erythropoietin opting stem cells for erythrocyte lineage and also stimulates the synthesis of hemoglobin, which results in increasing the number of red blood cells (RBC).<sup>7</sup>

Koloidosmotski pressure is the force with which blood proteins holding himself bound by a particular amount of water. Of 3.3 to 4kPa. The value depends on the concentration of protein in the blood. About 80% of the waste koloidosmotskog pressure on albumin plasma

because it is quantitatively the most common category of proteins. Albumin is synthesized in the liver and if the liver is damaged (mycotoxins and chemicals) by a reduced concentration of albumin in the blood, resulting in a decrease in the value koloidosmotskog pressure. Then the blood is present in the free fluid that comes through the walls of capillaries in the intercellular spaces and creates edema.<sup>4</sup>

## Clinical ascites

Ascites is characterized by accumulation of straw-colored fluid in thorax abdominal cavity, and hence the common name, water in the chest-the abdominal cavity. Accumulated fluid is actually a plasma which occur as the end result of a series of events that occur as a result of hypoxia. Due to hypoxia occurs heightened heart rate and hypertrophy of the right ventricle. Complications with hypoxia clearly indicate that the occurrence of ascites influence: the rate of growth and the environment. In chickens the first clinical symptoms appear when old bird 2 to 4weeks. It can be seen ruffled feathers, labored respiration and growth retardation. Due to an increase in abdominal penguin chicks take up position. Due to severe hypoxia, the disease was first established in clusters at high altitudes where the mortality of male broilers ranged from 20 to 30%. Ascites can occur at all altitudes. Today ascites is common in male broilers that are fed high-energy food. Ascites is often manifested panting even though there is no heat stress. In older birds the possible occurrence of cyanosis crest and podbradnjaka and death occur due to reduced volume breathing. Mortality was highest in chickens older than 4weeks. The peak incidence of ascites is between 6 and 7weeks of age.<sup>8</sup>

## Pathomorphological, hematological and his-topathological changes

After opening the thorax - abdominal cavity was observed the presence of clotted plasma proteins (fibrin) on the surface of the liver indicating that the liquid derived from the liver. Right ventricle was enlarged to 40% in relation to the normal size. You can see the different degrees of damage to the lungs, which are pale. The study established the occurrence of ascites dilatation and hypertrophy of the right ventricle, pulmonary edema and capsular fibrosis of the liver. Is observed microscopically smooth muscle hypertrophy parabronhija, which leads to collapse. It has been shown that in birds with ascites weight ratio of the right ventricle of the heart to the total weight (RV RT) x100 is 50, and in healthy birds the ratio is 20. Due to the dilation of the right ventricle systolic volume was increased to about 0.6ml, with a 0.1ml of healthy birds.<sup>9</sup>

Ultrastructural changes were found in the myocardium, ie. degeneration of myofibrils in which the observed disorganizacija sarcomere and mitochondrial hyperplasia. In the lungs of the pulmonary capillary congestion observed. And changing the structure of the failure, and renal dysfunction occur with an increased secretion of erythropoietin.

## Diagnosis of ascites

Ascites can be diagnosed premortalno and post mortem. Premortalno rarely diagnosed as occurs acutely and quickly came to death. In the case of early detection of problem premortalno to palpation of the abdominal part below the chest muscles feel under the fingers moving fluid.

Post-mortem diagnosis is very common. Dead birds generally

we find lying down on her back. Leather is finished with blue blue (cyanotic). By opening the thorax-the abdominal cavity is observed a large amount of fluid with or without fibrin clot (Figure 1). The amount of accumulated liquid may be from 100 to 300ml. The fluid accumulates in the pericardium (hydroperikard), leading to rapid death.<sup>1</sup>

For the diagnosis of ascites can be substantial and other facts, such as. composition and structure of the food, zoohygienic housing conditions (microclimate in the house), altitude, presence of other diseases (Table 1).<sup>9</sup>



**Figure 1** The fluid in the chest-the abdominal cavity with fibrin.

**Table 1** The effect on the occurrence of ascites physiological parameters in chickens 35day old. Maxwell et al.<sup>7</sup> show the effect on the occurrence of ascites physiological parameters.

The parameters of	Healthy birds	Birds with ascites
Body weight(g)	1390	960
Heart weight(g)	9,5	9,3
% Of heart to body weight	0,7	1
Konc. Hemoglobina(g/100ml)	9,3	11,6
PCV(%)	30	38
RBC ( $10^6/mm^3$ )	2,6	3,2
WBC ( $10^6/mm^3$ )	16,1	20,5
Lymphocytes(%)	71	52,6

### Prevention and treatment of ascites

Since we find signs of ascites, rapid mortality occurs and is impossible to therapy. In the case of a large number of cases of ascites, the losses can be reduced using the following measures:

- Use of low energy food limiting diet. Moving from the finely ground pelleted feed. Reduce contamination of food with toxins to a minimum, increase vitamin E, vitamin C and organic selenium in foods. Reduce sodium levels in foods to 0.19%.
- low outside temperatures lead to increased demand for oxygen, and it can be a trigger mechanism of ascites. It is especially important to take into account the temperature in the house in the first 2weeks of life, because then the birds most susceptible to low temperature stress. For example, lowering the temperature to 10°C doubles the demand for oxygen.<sup>2</sup>
- Control of contamination of the air in the house. It is necessary to optimal ventilation to the concentration of harmful gases and dust in the air reduced to the minimum values. The most important thing is to pay attention to maximum permissible concentration of ammonia in the house, which is up to 50ppm. The optimal concentration is 25ppm of ammonia. Take into account the moisture mat, because when increasing its humidity leads to increased concentrations of ammonia.
- Reduce the length of day light or light intensity, because in this way reduces food intake and activity.<sup>6</sup>

### Acknowledgements

None.

### Conflict of interest

Author declares that there is no conflict of interest.

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