

The use of acidifiers to alleviate ascites in poultry

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Despite investigation of the ascites syndrome for many years, it is still a condition that inflicts financial loss on poultry farmers around the world.

It is estimated that of the 40 billion broilers produced annually around the world, 5% of these as well as 20% of roaster birds die of ascites.

The incidence of ascites has been increasing in recent years.

According to an annual survey in the UK, broiler producers reported 88 and 130 million death cases due to ascites in 2005 and 2006 respectively.

The cost to the broiler industry of ascites related condemnation of chicken carcasses at processing reached US\$2.25 million dollars in 2003.

The cost to the worldwide broiler chicken industry due to ascites related mortality has been estimated to be in excess of US\$500 billion per year.

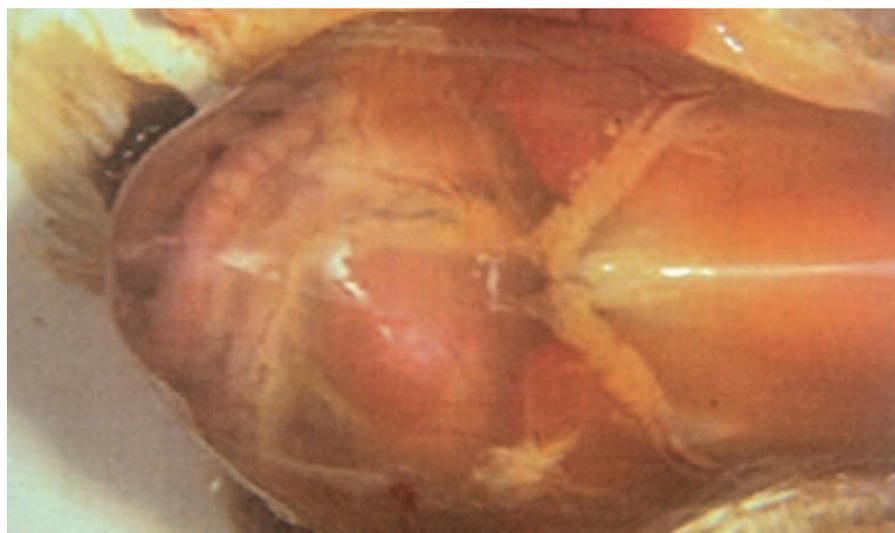
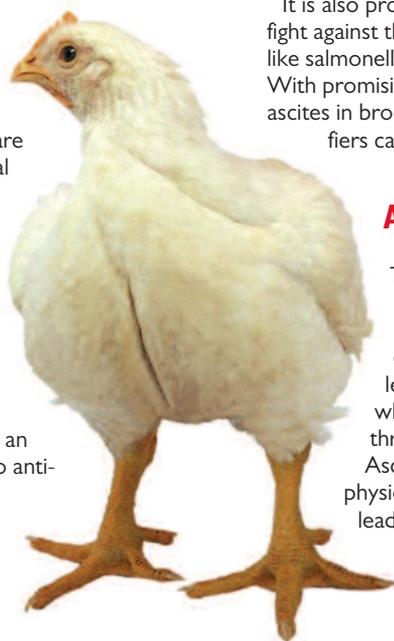
The question is: How can ascites be minimised?

Traditionally, genetics have been blamed for ascites in bird flocks, however, breeding companies have improved genetic resistance of stock to this syndrome.

In reality, a considerable number of ascites occurrences are triggered by microbial factors (*E. coli*, salmonella, aspergillus) coupled with contributing environmental and nutritional factors.

Acidifiers have gained considerable attention in modern animal production as an efficient alternative to antibiotics.

Dietary acidification with organic acids has been shown to contribute



Opened abdominal cavity of an ascitic broiler chicken showing the abundance of ascetic fluid.

to environmental hygiene by preventing feed and water from microbial and fungal deterioration.

Moreover, dietary supplementation with acidifiers decreases the occurrence of pathogenic bacteria in the gastrointestinal tract thus improving animals' growth performance and health status.

It is also proven that acidifiers successfully fight against the gastrointestinal pathogens, like salmonella, *E. coli* and campylobacter. With promising results in the alleviation of ascites in broilers, the application of acidifiers can be further expanded.

Ascites in poultry

The ascites syndrome in broiler flocks has been increasing at an alarming rate, and this condition has become one of the leading causes of mortality and whole carcass condemnations throughout the world.

Ascites represents a spectrum of physiological and metabolic changes leading to the excess accumulation of fluid in the abdominal cavity.

These changes occur in

response to a number of dietary, environmental and genetic factors.

Improvements in growth performance and decreases in mortality rates, as well as benefits in alleviating ascites have been observed in recent trials with Biomin's acidifier product Biotronic SE.

Definition

The term 'ascites' actually refers to the fluid accumulation in the abdominal cavity (or so called 'waterbelly'). The disease is more scientifically known as pulmonary hypertension syndrome.

Ascites is most commonly diagnosed at four to five weeks of age. Total mortality due to ascites is higher in the male parent lines, which have the capability of faster growth and higher muscle deposition compared to the female lines.

Pathology

The pathology is associated with abnormally high blood pressure between the heart and lungs (pulmonary hypertension) leading to heart failure, increased blood pressure in

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the veins and excessive build-up of fluid in the liver which leaks into the body cavity.

Characteristic symptoms include:

- Poor bird development.
- Dilated abdomen ('waterbelly').
- Dyspnoea (panting, accompanied with gurgling sounds, even in the absence of apparent heat stress).
- Possible cyanosis (a blue discolouration of the skin, especially around the comb and wattles and muscle tissue).

Aetiology

The aetiology of ascites is very conflicting. Usually genetics have been blamed for the ascites. However, breeding companies have improved genetic resistance of stock to ascites.

The combination of environmental (ambient temperatures, high altitudes, stock density, air quality), nutritional (diet density, feeding type), hygienic (feed, environmental hygiene) and genetic events lead to this metabolic disease.

A considerable number of ascites syndrome in broiler flocks is caused by micro-organisms. Most of the Gram negative bacteria (*E. coli*, salmonella, campylobacter) are considered pathogenic because of their lipopolysaccharide (LPS) layer.

Some studies have shown that LPS triggers pulmonary vasoconstriction leading to ascites (pulmonary hypertension) in broilers.

Airborne LPS is ubiquitous in the environment of broilers and is positively related to the amount of organic dust in poultry houses.

For example, respiratory exposure to *E. coli* can amplify the incidence of ascites five-fold in broilers. It is known that *Salmonella typhimurium* may cause up to 79% mortality in one week old chickens.

However, in some studies lesions of salmonellosis were reported for four to six week old broilers with *E. coli* co-infection consequentially leading to ascites.

Another pathogenic agent is the mould, *Aspergillus fumigatus*, which is occasionally present in the environment of all poultry.

Disease caused by this mould, so called 'brooder pneumonia', forms mould colonies in the lungs, and produces hard nodular areas leading to air sac infection and subsequently to the development of ascites.

Treatment and prevention

Firstly, it is important to understand the underlying causes of an ascites occurrence on a poultry farm. In the case of ascites caused by genetics, feed restriction might reduce the effect of the disease.

Slower growing birds have reduced oxygen needs allowing the cardiopulmonary organs (heart and lungs) to keep up with oxygen demands of the birds.

However, reducing the feed intake of

	Negative control group	Positive control group	Biotronic SE group
Day 14			
No. of chickens	300	299	299
Final bodyweight (g)	246.0	238.0	241.0
Mortality rate (%)	0.00	0.33	0.33
Day 35			
No. of chickens	294	291	293
Final bodyweight (g)	1104.0	1301.0	1288.0
Mortality rate (%)	2.04	3.09	2.39
Day 42			
No. of chickens	279	285	289
Final bodyweight (g)	1708.0	1805.0	1813.0
Mortality rate (%)	7.53	5.26	3.81
Day 46			
No. of chickens	260	279	281
Final bodyweight (g)	1835.0	2019.0	2066.0
Mortality rate (%)	15.39	7.53	6.76

Table 1. Effect of Biotronic SE on body weight and mortality rate in broilers.

broilers decreases the growth performance. Feed restriction is only of economic benefit when the incidence of ascites is very severe.

In the case of ascites caused by micro-organisms, recent studies investigating the effect of feed supplementation with acidifiers have shown promising results. Of course, optimal management practices are also very important for reducing the problem of ascites and maximising performance of broilers.

The effect of the acidifier Biotronic SE on ascites incidence was studied on a commercial broiler farm in Bolivia.

Trial design

Nine hundred day-old Cobb 500 male broiler chicks were divided into three groups. The birds were fed a corn-soybean meal diet.

The negative control group diet contained no feed additives, whereas the diet of the positive control group was supplemented with an antibiotic growth promoter (AGP), and the trial group was supplemented with the acidifier Biotronic SE at an inclusion rate of 1.5kg/t feed.

The duration of the trial was 46 days. The weight of the birds was recorded on days 14, 35, 42 and 46. Mortality and observations of the birds for abnormalities (diarrhoea, depression, immobility) were carried out daily.

Farm management

The trial was conducted on a commercial broiler farm 2,600 metres above sea level in Bolivia. The mean external ambient temperature was 18°C, and the humidity was 40%.

The birds were vaccinated against

Newcastle, infectious bronchitis and infectious bursal disease.

Ascites incidence

Ascites incidence was characterised by clinical signs (panting, gurgling sounds, cyanotic combs and wattles, excessive abdominal fluid accumulation) and mortality rates.

The incidence of ascites was confirmed by post-mortem examination.

Results and discussion

For the initial 42 days, the broilers did not show any obvious clinical signs of ascites, even though on day 35 mortality rates were recorded in the negative control, positive control and Biotronic SE groups as 2.04, 3.09 and 2.39% respectively (Table 1).

On day 42 an outbreak of ascites was observed on the broiler farm with typical ascetic symptoms such as gasping, cyanotic combs and wattles, depression, extended abdomens, and increased mortality rates up to 7.53, 5.26 and 3.81% in the negative control, positive control and Biotronic SE groups respectively.

In the Biotronic SE group, the mortality rate increased 37.27% over the mortality rate prior to the ascites outbreak, compared to 72.90 and 41.25% respectively in the negative control and positive control groups.

Necropsy of the dead birds revealed the characteristic lesions of ascites. Amber or clear fluid (lymph) was found in the abdominal cavity, hearts were enlarged with fluid in the pericardium (the sac surrounding the heart), livers were swollen and congested and sometimes with fibrin adhered to their

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surface, and lungs were pale or grayish. By the end of week seven the mortality in the negative control and positive control groups reached 15.39% and 7.53% respectively, whereas the group fed diets supplemented with Biotronic SE recorded the lowest mortality rate at 6.76%.

This trial result demonstrated that diet supplementation with the acidifier Biotronic SE represents a solution to alleviate the effect of ascites on broiler farms.

In this study, ascites could be attributed to a microbial cause, most probably salmonella or *E. coli* and some other co-infection agents.

The genetic cause of ascites herein might be excluded, since the growth of the broilers was much lower compared with the standard growth performance of the Cobb 500.

Due to poor hygienic conditions on the farm, conditions for the proliferation of pathogenic micro-organisms in the environment and feed were favourable.

Moreover, some predisposing factors such as high altitude and insufficient ventilation were present, exacerbating the ascites syndrome in this broiler flock.

Due to its antimicrobial effect, Biotronic SE improved the environmental hygiene and prevented the feed from microbial and fungal deterioration.

In addition, dietary supplementation with

acidifiers is known to decrease the occurrence of pathogenic bacteria in the gastrointestinal tract thus improving the animals' health status.

This was confirmed by the reduction of mortality rates in the Biotronic SE group compared with the negative control and positive control (AGP) groups.

In this trial, the addition of Biotronic SE to the feed was effective in alleviating the effect of ascites caused by microbial factors in broilers.

The Biotronic product line consists of products available in both powder and liquid forms for application in feed and water – ideal and practical solutions for prevention

and control of ascites outbreaks in broiler flocks.

Conclusion

In modern animal production acidifiers have been proven to be an efficient alternative to antibiotics. Dietary acidification contributes to environmental hygiene, with a continued function through either the feed or water into the animals' gastrointestinal tract.

Biotronic SE has been successful in alleviating the effects of various intestinal diseases, with its action against ascites in broilers the latest application available to producers. ■

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