Avian intestinal spirochaetosis

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Avian intestinal spirochaetosis (AIS) is generally considered a growing problem in poultry production. It can be caused by several spirochetes, which are helical shaped bacteria that colonise the large intestine of many mammalian and avian hosts, including swine, humans and poultry.

As birds can be a carrier of these organisms without any clinical symptom, the term AIS is reserved for these conditions where some clinical signs are accompanied (and caused) by the presence of some species of spirochetes.

In the past, its importance was mainly recognised in egg producing birds. Indeed in both layers and breeders, intestinal spirochaetosis is known to affect egg production.

It is also known to cause diarrhoea, leading to 'dirty eggs' and, as a consequence, downgrading of these eggs.

However, recently more attention has been given to its impact in, for example, meat type turkeys and broilers, where it is considered as one of the many possible causes of enteric disorders and also as a cause of loss of zootechnical performance.

Seven species of these spirochetes have been recorded as colonising poultry, although only three of them are really considered as pathogenic (Brachyspira pilosicoli, B. alvinipulli and B. intermedia).

Aetiology

Intestinal spirochetes are Gram negative, helical shaped bacteria colonising the caeca and rectum of avian species. They are made up of a central protoplasmic cylinder, multiple periplasmic flagellae and an outer envelope.

Rotation of these periplasmic flagellae results in a typical motility which allows these spirochetes to traverse very viscous substances, such as mucus that can easily immobilise 'normal' external flagellated organisms. B. pilosicoli, B. avinipulli and B. intermedia are the three best known pathogenic species, although other species are known to colonise poultry as well.

B. hyodysenteriae, the causative agent of swine dysentery, is known to survive for 60 days in faeces. It is very likely that the same applies for the species relevant to poultry.

Virulence factors determine colonisation, induction of lesions and disease.

Although far from completely understood, adherence, bacterial motility, chemotaxis and haemolytic activities are some of these virulence factors. It is noteworthy that no really reproducible challenge model exist, making the study of the disease quite difficult.

Epizootiology

Cases of avian intestinal spirochaetosis have been described on at least three continents – Europe, North America and Australia. It is very likely that other continents experience the disease as well. The economic importance is not always very clear but probably very often underestimated.

Indeed, there are real problem farms, especially in Europe, which suffer from the disease to an obvious economic degree and probably many more farms that suffer somewhat less clinical symptoms but that still have an economic impact.

Pathology

Poultry can be asymptomatic carriers of several spirochete species, even at the same time.

So, onset of clinical disease is influenced by many general factors such as host species, nutrition, physiological distress, husbandry and immune status.

Specific factors that have been demonstrated to increase frequency of colonisation and severity of disease are moulting, start of egg production, poor feed quality and floor housing. Transmission goes via the faecal-oral route.

In the case of B. alvinipulli colonisation, layers had wet faeces and clinical diarrhoea with consequently stained eggs. With B. pilosicoli colonisation, as well as the above mentioned symptoms, a 5% decrease in egg production and lethargy was also noticed.

Layers colonised with B. intermedia had retarded growth rates as well as the above mentioned problems.

In turkeys, broilers and broiler breeders symptoms of AIS are similar to those of layers, but the growth retardation is most severe in broilers. It is noteworthy that progeny of colonised broiler breeders show substantially poorer zootechnical performance compared to that of non-colonised breeders.

Caecal contents can be yellowish, frothy to fluid. Histological examination of the caecal walls will reveal typhlitis to various extents.

Diagnosis

The presence of spirochetes can be confirmed by light microscopy, although AIS can only be diagnosed when characteristic clinical signs and caecal lesions or contents are also present. Haemacolour colouration can be used to facilitate finding the helical shaped bacteria.

Successful culturing depends on many factors such as the number of bacteria and the storage and shipping condition of the sample.

PCR tests are available to identify and differentiate several species including B. pilosicoli, B. hyodysenteriae and B. intermedia.

Next to these methods, various immunological and molecular methods have been developed.

Control and treatment

Classical control measures will include maintaining good biosecurity and appropriate husbandry practices. This also means avoiding the above discussed provoking factors.

In some parts of the world Vetmulin/Rodotium (tiamulin hydrogen fumarate) has proven to be a very efficacious treatment in those cases where AIS has developed severely.

In some EU countries Vetmulin/Rodotium is filed with a zero days withdrawal time for layers producing table eggs. ■

References are available from the authors on request
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