Layers and intestinal spirochaetosis

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Avian intestinal spirochaetosis (AIS) is a gut infection, mainly involving the hen's caeca, which causes a chronic drop in egg production of usually 5-12%. The disease is caused by a variety of spirochaete bacteria, now called Brachyspira (formerly known as Serpulina, Treponema and even Vibrio).

These organisms colonise the epithelial surface of the caeca and cause a variable degree of damage that results in low grade diarrhoea, often reported as a higher incidence of brown, soft, caecal droppings.

It has been found in replacement pullets, but this is relatively uncommon, and is more often observed later as the birds are coming up to peak production and like a number of avian infections causes them not to reach peak or have only a short peak production period and then a drop below standard production (see Fig. 1).

This drop can last the whole laying period, if not diagnosed or treated.

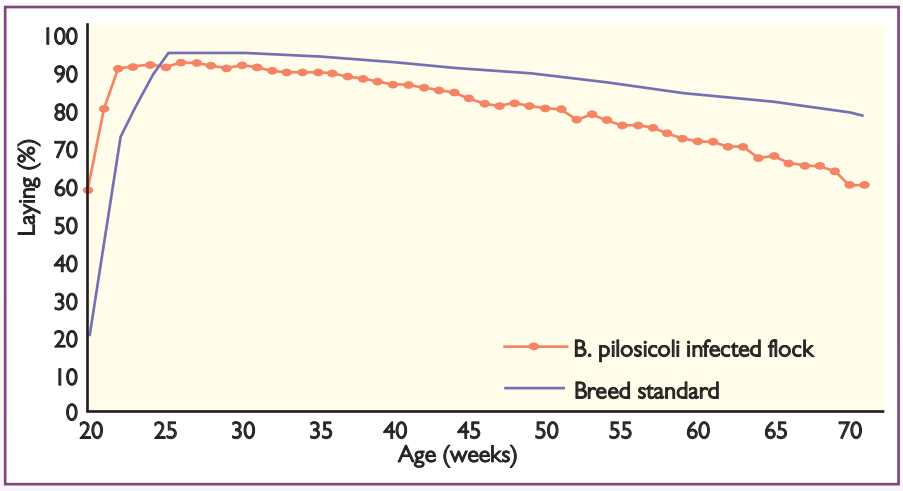

Fig. 1. Performance (laying %) of a Brachyspira pilosicoli infected flock against the breed standard.

Differentiate various strains

It is only in recent years we have been able to differentiate between the strains of Brachyspira, which can be found in the chicken's intestine following excellent work by David Hampson's group in Murdoch University, Western Australia.

This has enabled laboratories to differentiate the various strains, some of which are reported as being non-pathogenic, for example, do not cause disease, like B. innocens and some that can such as B. pilosicoli and B. intermedia. It is, therefore, an important part of diagnosis to differentiate the species of Brachyspira that is involved.

In the UK, Thomson and others recently reported on their findings in the UK based on 257 layer samples from 96 farm submissions (see Table 1).

Of farms 49% had infections with either B. pilosicoli or B. intermedia, the major species associated with the disease.

Multiple pooled-faeces samples were taken from each farm to try to increase the chances of diagnosis as Brachyspira are difficult to culture and to differentiate the species requires additional culture and biochemical tests.

PCR tests have been used for screening purposes but currently do not differentiate between all the species.

Other Brachyspira spp were also isolated, such as B. hyodysenteriae (commonly associated with on-site pig production) and B. alvinipulli, which has mainly been reported in the USA, and is considered mildly pathogenic like B. pilosicoli.

In other UK work, B. murdochii has also been identified and clinically has been associated with a fall in egg production.

Little work has been done on the pathogenic effect of these various spirochaetes but a study was reported where different Brachyspira species were given to day old chicks to see if they would colonise the gut and would have a depressive effect on chick growth (see Fig. 2).

It would appear that B. aalborgi was non-pathogenic and interestingly B. pilosicoli was also not pathogenic in this study, but B. murdochii, B. intermedia and B. hyodysente-

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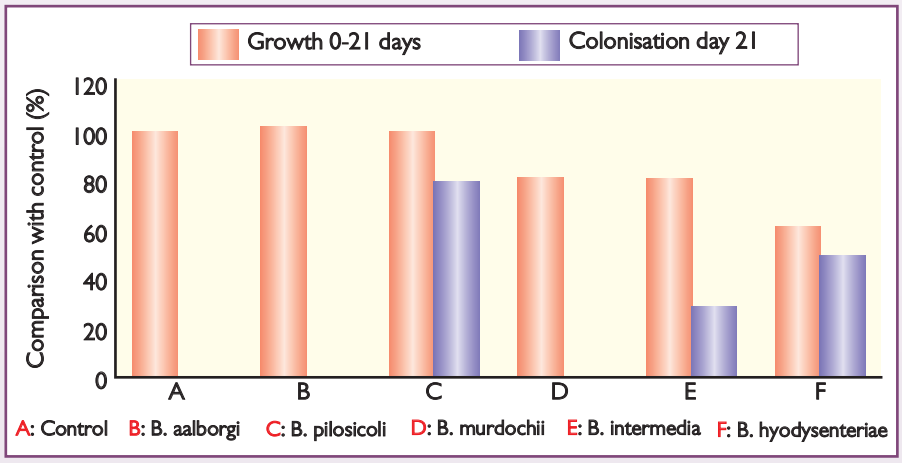
Fig. 2. Effect of different Brachyspira spp on the colonisation (%) and depression of growth in day old chicks (%) over a three week period.



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riae were, with the latter being the most damaging.

Brachyspira pilosicoli, however, was a good gut coloniser, as well as B. intermedia and B. hyodysenteriae. Brachyspira murdochii appeared to be a relatively poor coloniser, which may account for its infrequent isolation in the field but it and B. hyodysenteriae could be potentially pathogenic in chickens.

In the UK, there appears to be a predisposition for free-range flocks to be affected and in one small survey 70% were infected either with B. pilosicoli and B. intermedia but primarily the latter.

In most countries, hens are kept in cages and away from direct contact with droppings and potentially other sources of infection such as wild birds.

However, even in Australia and Italy reports have shown that over 30% of flocks were infected with either B. pilosicoli or B. intermedia, suggesting that the problem is more widespread than may have been commonly thought.

Brachyspira isolate	Farm submissions (%)	Positive samples (%)
Negative	29	54
B. innocens	28	14
B. pilosicoli	25	14
B. intermedia	24	16
B. hyodysenteriae	4	1
B. alvinipulli	1	0.4
Atypical Brachyspira	6	3.5

Table 1. Brachyspira species isolated from UK layer samples.

In Italy, Bano and others associated it more frequently in older birds greater than 40 weeks of age and also in deep pit systems, rather then where the droppings are removed by conveyor belt.

He also commented that the higher number of flies present in these sheds could well be a contributing factor.

In our experience, multi-age sites can also maintain the infection cycling from house to house and infect birds at a younger age and become apparent at peak laying.

Deep pit laying house with fly control board.

Treatment of spirochaetosis in layers is increasingly being carried out with the use of tiamulin, for example in a product such as Denagard from Novartis, at 125-250ppm via the drinking water. This is highly effective against most of the avian spirochaetes and is becoming almost a diagnostic tool.

In several countries in Europe, tiamulin currently has a zero withdrawal period for eggs so may be used in laying hens. In some countries in Asia and the Pacific it is used in feed as a preventative at 20-50ppm with a zero withdrawal for eggs too.

Although avian intestinal spirochaetes have been around for some time, it is only in recent years, with significant improvements in isolation and differentiation that we are discovering more about the disease.

As with any new subject, there appears to be more questions than answers but hopefully we will solve these problems and be able to control the infection and improve the egg production and profitability of laying hens in due course. ■