

EFFECT OF TIAMULIN ON *BRACHYSPIRA* SPECIES WITH HIGH MICS IN LAYERS

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Introduction:

The use of tiamulin (Denagard® - Novartis Animal Health Inc.) has been described to treat avian intestinal spirochaetosis (AIS) in artificial infection studies with *Brachyspira pilosicoli* and *B. intermedia* (Stephens and Hampson, 2002; Hampson *et al.*, 2002) and with *B. pilosicoli* in the field (Burch *et al.*, 2006). Further field work was required to demonstrate the efficacy of the product.

Objective:

The objective of this pilot study was to evaluate the efficacy of tiamulin given in the drinking water to treat a naturally occurring field infection of mixed avian *Brachyspira* species, causing clinical disease in laying hens.

Materials and methods:

Thirty layers were selected for the trial from a group of hens supplied by a free-range flock of approximately 72 weeks of age with a history of avian intestinal spirochaetosis (AIS), showing characteristic signs of brown, soft, caecal droppings (see Photos 1 and 2).



Photo 1. Normal droppings

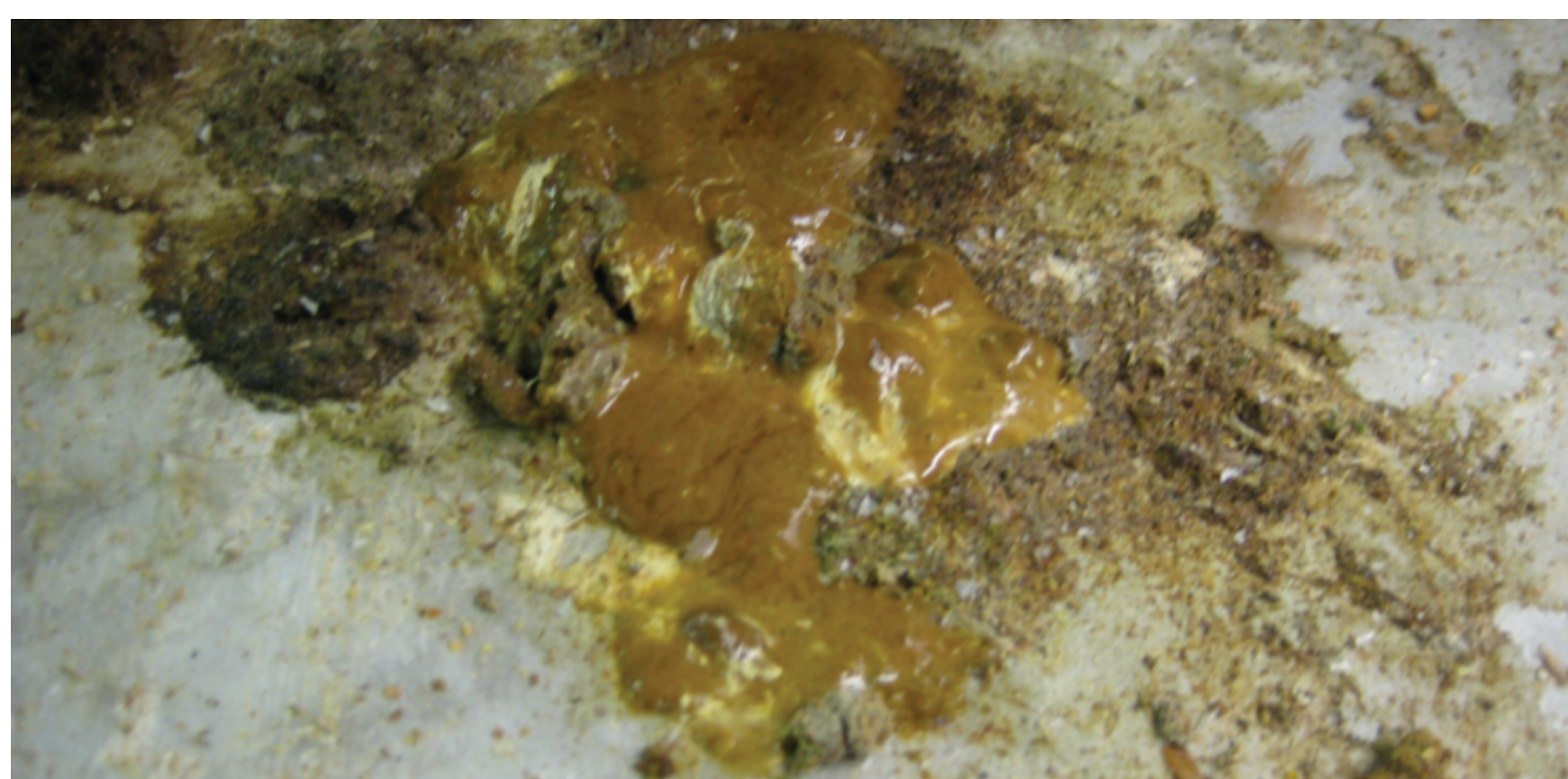


Photo 2. Caecal droppings associated with AIS in the trial birds

They had been previously tagged, weighed and placed in individual cages. Before the trial started, faecal swabs had also been taken for culture and PCR for *Brachyspira* spp and the majority of birds were found to be positive with *B. intermedia* or a lower level with *B. pilosicoli* and *B. innocens* by culture. The PCR test used (based on 23s RNA gene) could not differentiate *B. intermedia* and *B. innocens*. The hens were allocated to one of the two treatment groups, either untreated controls or those given tiamulin at 250ppm in the drinking water from trial days 0-5. Faecal samples (FS) were sent for culture and PCR on day 0, 3, 5, 12 and day 18, when the trial was terminated. Five birds per treatment group were necropsied on trial days 3, 5, and 18 and their caecal contents samples (CS) cultured and PCR tested for avian *Brachyspira* spp.

Results:

The PCR results for faecal and caecal samples are highlighted in Figure 1 and culture results in Figure 2.

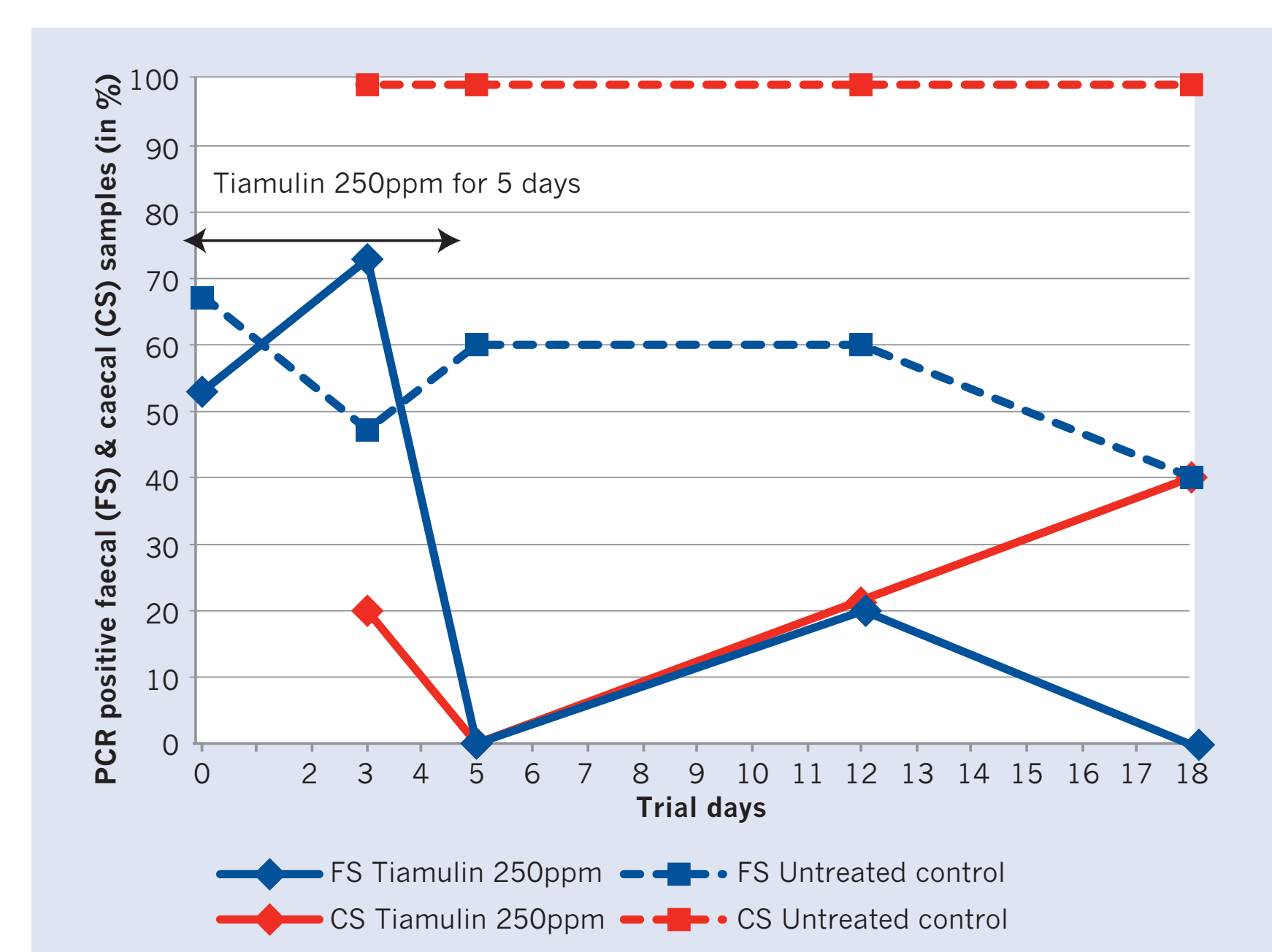


Figure 1. *Brachyspira* spp PCR positive faecal (FS) and caecal samples (CS) in percent

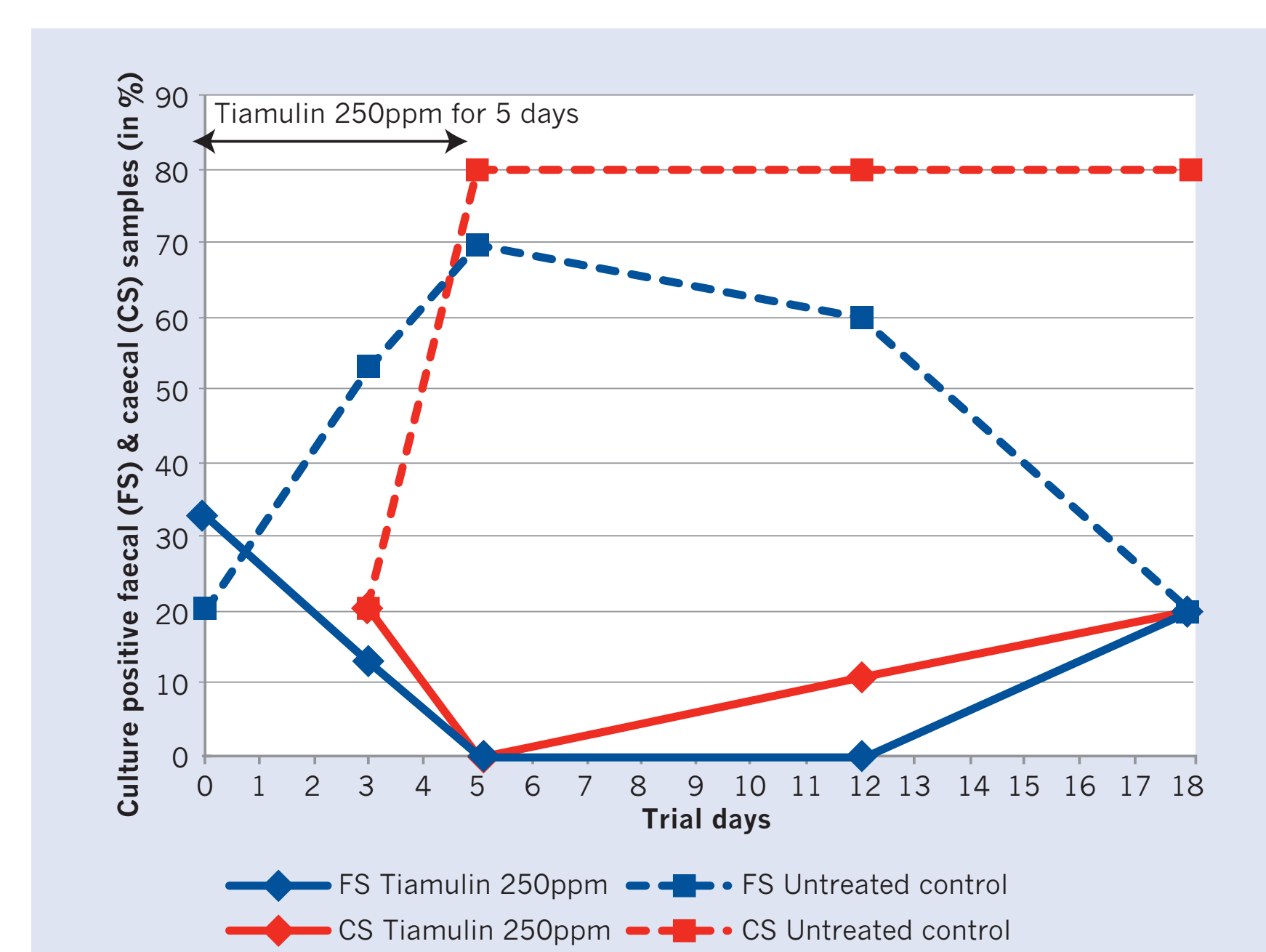


Figure 2. *Brachyspira* spp culture positive faecal (FS) and caecal samples (CS) in percent

At sampling days 3, 5 and 18, 100% of the caecal samples at autopsy were PCR-positive for *B. intermedia* in the untreated controls but only between 40-60% of the faecal samples. At day 3, the tiamulin-treated hen's caecal samples showed a significant reduction to 20% ($p < 0.05$) and at day 5 there was a decline in positive samples to 0% in both caecal and faecal samples, which was also statistically significant ($p < 0.01$), in comparison with the untreated controls. This subsequently rose to 40% in caecal samples but 0% in faecal samples at day 18. The minimum inhibitory concentrations of tiamulin against *B. pilosicoli* were reported at 0.125µg/ml; for *B. intermedia* isolates between 0.5-16µg/ml and *B. innocens* isolates between 1.0-8.0µg/ml. *Brachyspira pilosicoli* was not demonstrated after the start of treatment nor during the observation period, in both treated and control hens.

Conclusions:

Tiamulin at 250ppm in the drinking water for 3-5 days significantly reduced the colonisation of the caeca by all *Brachyspira* species identified. Caecal sampling appeared to give more reliable and accurate results than faecal sampling. Although *B. intermedia* disappeared after 5 days of medication, it did return in the caeca suggesting there was an inhibitory effect against this bacterium. This was observed by Hampson *et al.* (2002) and may explain the recurring problems that are commonly seen in free-range flocks. *Brachyspira pilosicoli* disappeared in both groups, possibly due to the strong competitive challenge of the other *Brachyspira* species. The range of tiamulin MICs for both *B. intermedia* and *B. innocens* was particularly high. Nevertheless, the results indicate that such inhibitory concentrations of tiamulin are achieved in the caeca when administered at the inclusion rate of 250ppm in the drinking water.

References:

- Stephens, C.P. and Hampson, D.J. 2002. Avian Pathology, 31, 299-304.
- Hampson, D.J. *et al.*, 2002. Avian Pathology, 31, 285-291.
- Burch, D.G.S. *et al.*, 2006. Avian Pathology, 35, 3, 211-216.

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