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Treatment of a field case of avian intestinal spirochaetosis caused by *Brachyspira pilosicoli* with tiamulin

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There has been much confusion over the significance of spirochaetes found in the caeca of laying hens and the impact they may have on egg production. In recent years, the situation has been made clearer and the presence of such species as *Brachyspira pilosicoli* have been shown to cause a mild, chronic disease in both layers and breeders and to reduce egg production by reportedly 5%. In the United Kingdom, a multi-age caged laying site with three separate flocks of approximately 12 000 birds each was chronically infected with *B. pilosicoli* but displayed few clinical signs except for a noticeable reduction in egg production and an increased mortality. The flocks were treated for 3 days in the drinking water with tiamulin at 12.5 mg/kg bodyweight, and a steady improvement in performance was recorded. The production results were compared with a flock that had been untreated with tiamulin previously, as a control, and one that had been treated at 25 and 45 weeks of age. A 9.8% improvement in egg production/hen housed up to 72 weeks of age and 9.7% in total egg weight was recorded, as well as an 8.6% reduction in actual hen mortality, in the tiamulin-treated flock in comparison with the untreated control. After taking into account the difference in breeds used, there was only a 6% reduction in egg production but an 8.84% increase in mortality in the untreated flock compared with the individual breed's standard production data. The cost of the disease was estimated at £14 million in the United Kingdom, based on a national laying flock of 30 million or 1.5% of production. Faecal examination for potentially pathogenic spirochaetes should be part of the differential diagnosis of under-performing laying flocks.

Introduction

Avian intestinal spirochaetosis is defined in general terms (Swayne, 2003), as a spirochaete colonization, predominately of the caecum and/or rectum of poultry. However, this is to be distinguished from the clinical disease, which is described in pullets, layers and breeders as causing soft to watery, brown to grey diarrhoea and pasty vents, and is often associated with a delayed onset of lay in pullets, reduced egg production and body weight in layers and poor chick quality from infected breeders (Smit *et al*., 1998). The severity of the condition depends on the pathogenicity of the spirochaetes and their relative destruction of the surface epithelium of the caecum and degree of typhlitis caused. It is a chronic infection, with colonization and excretion of the organisms for several months (Dwars *et al.*, 1990; Hampson & McLaren, 1999).

Spirochaetes were commonly found in the caecum of layers and breeders (Dwars *et al.*, 1989; Stephens & Hampson, 1999) but were not always associated with clinical disease. Initially, this led to confusion over the significance of spirochaete infections in chickens—until the 1990s, when the different spirochaetes found in poultry were better classified genetically and phenotypically (McLaren *et al.*, 1997; Phillips *et al.*, 2005).

Stephens and Hampson (2002a) showed that *Brachyspira pilosicoli* was potentially pathogenic in breeder layers, causing a delayed onset of lay and a significant reduction in egg production, in comparison with *Brachyspira innocens*, which was shown to be non-pathogenic. Hampson & McLaren (1999) found that an isolate of *Brachyspira intermedia* also caused a significant reduction in egg production and also mean egg weight. *Brachyspira alvinipulli* has also been shown to be mildly pathogenic in the United States (Swayne *et al*., 1992; Swayne, 2003).

The association of spirochaetal infections in laying flocks with enteric disease in Holland was reported by Dwars *et al* (1989). In a study of 179 flocks, spirochaetes could be demonstrated in 27.6% of flocks with reported enteric disorders but only in 4.4% of flocks with no enteric signs. In Australia (Stephens & Hampson, 1999), the prevalence of spirochaetes in 50 flocks tested appeared to be much higher; with 42.9% of breeder flocks and 68.2% of layer flocks infected using a different methodology. Isolates from a subset of 16 flocks were investigated to a species level, and *B. pilosicoli* and *B. intermedia* were found in eight flocks (50%) *B. pilosicoli* in six flocks (37.5%) and *B. intermedia* in four flocks (25%) either alone or in mixed infections. Bano *et al.* (2005) reported on a survey in northeastern Italy involving 29 layer farms. Spirochaetes were found in 72.4% of the layer farms and 71.1% of the

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sheds. The pathogenic spirochaetes *B. pilosicoli* and *B. intermedia* were found in 31% of the sheds in an approximate 1:2 ratio.

The susceptibility of avian spirochaetes to a variety of antimicrobials was reported by Hampson & Stephens (2002) using an agar dilution method. Tiamulin was shown to be the most active, with 15/19 (79%) isolates having a minimum inhibitory concentration of less than 0.1 μg/ml and the remainder were between 0.1 and 1.0 μg/ml. Other anti-spirochaetal antimicrobials were also shown to be active, such as metronidazole, lincomycin and, to a lesser extent, tylosin.

Stephens & Hampson (2002b) carried out an artificial challenge study with *B. pilosicoli* in broiler breeders and administered tiamulin at 25 mg/kg bodyweight/day by crop tube for five consecutive days. Birds that had been infected and treated stopped shedding *B. pilosicoli,* whereas the untreated infected birds continued to shed until termination of the study, 4 weeks later.

It is the purpose of this report to describe the use of tiamulin in the field in flocks that had been chronically infected with *B. pilosicoli* and their response to treatment.

Clinical Case

A commercial laying farm, with three caged flocks of approximately 12 000 birds each was reported to be showing reduced egg production and poor performance over an 18-month period. Each flock was subjected to serological examination at 20 weeks of age to monitor the efficiency of the vaccination programme during rearing to act as a baseline for any subsequent investigations. Generally these point-of-lay results indicated good to very good levels of protection against the common viral infections. The subsequent production problems were investigated serologically using both haemagglutination inhibition and enzyme-linked immunosorbent assay tests, looking for challenges from infectious bronchitis virus (M41) and variants (793B, D274 and D1466), avian rhinotracheitis virus, *Mycoplasma gallisepticum* and *Mycoplasma synoviae.* There was evidence of rising titres from intermittent challenges by infectious bronchitis variants, mainly 793B and D274, in common with the situation on other units belonging to the company, but these did not appear to correlate with the production problems on this site as there were no clinical signs noted. All flocks had been vaccinated at least twice against the infectious bronchitis variants found. *M. synoviae*, which is commonly reported (79%) in the UK laying flocks (Hagen *et al.*, 2004), was also present in these flocks. There was no response to treatment with chlortetracycline administered via the feed at 600 parts/10^6 at regular 7 to 8 week intervals to control any mycoplasmal infections and related conditions. The level of soft faeces was higher than normal but not considered widespread. Faecal samples were collected in each shed from 12 cages, each containing five hens, by placing cling-film-covered cards under the cages. Aliquots of faeces, including any abnormal droppings were then transferred into six 5-ml containers, filled to capacity to exclude air. These samples were sent for examination at the Veterinary Laboratories Agency (VLA) in Sutton Bonington, specifically for *Brachyspira* spp. examination, which is not routinely carried out on poultry faeces in the United Kingdom. Spirochaetes were observed weakly fluorescing, following fluorescent antibody staining (fluorescent antibody test(FAT)) using a *B. hyodysenteriae*-specific antibody and positive samples were submitted to culture. Spirochaetes were subsequently cultured and shown to cause a weak haemolysis on trypticase soy agar plates with defibrinated sheep blood with antimicrobials, spectinomycin, colistin and vancomycin to prevent overgrowth by other bacteria. Cultures were sent to VLA Winchester for definitive identification by biochemical tests. The presence of *B. pilosicoli* was confirmed by biochemical differentiation and found to be indole-negative but hippurate-positive. Serum agglutination tests with *B. hyodysenteriae*-specific serum were negative. Initially, only one shed was shown to be positive, but on repeated sampling all three sheds yielded *B. pilosicoli*. Polymerase chain reaction tests for *Brachyspira* spp. were not available in the VLA in England and minimum inhibitory concentration (MIC) testing of isolates, especially from poultry, was not routinely carried out.

Several postmortem examinations were performed over the problem period, especially when mortality rates were much higher than usual. The vast majority of deaths were associated with peritonitis caused by *Escherichia coli*.

Following consultation, it was decided to treat the oldest flock with tiamulin at 12.5 mg/kg bodyweight for 3 days via the drinking water. The daily dose in pigs for *B. hyodysenteriae*, a related organism, which causes swine dysentery, was 8.8 mg/kg bodyweight for 3 to 5 days. It was reported that the birds showed consistent and steady improvements in faecal consistency, appetite, body weight, egg production and mortality. It was decided to medicate the two remaining younger flocks; one was 45 weeks of age and the other was 25 weeks of age. Additional tiamulin medication was applied at 60 weeks and 45 weeks of age to each flock, respectively, as a precaution against possible recurrence, following rigorous insect-control measures, as it was thought likely that flies might maintain the spread of the infection. Unfortunately, no further faeces samples were taken following medication to test for the elimination of the *B. pilosicoli* infection as it was a clinical problem in the field, rather than a clinical trial, and costs to the farmer were to be kept to a minimum.

Results

The production data from an earlier flock, which had not been treated with tiamulin, were compared with the two younger treated flocks (see Table 1).

A similar number of birds were housed in each house but the untreated control flock (Flock A) was of a different breed, Lohmann Brown, rather than the two treated flocks, which were Bovans Goldline (Flocks B and C).

In egg production terms the treated flocks showed a graded response to tiamulin treatment with the later treated flock (Flock B, 45 and 60 weeks), showing a 5.2% and 5.6% improvement over the untreated flock (Flock A) in egg numbers and total egg weight when adjusted to a 72 week age for comparison purposes, and the flock treated at 25 and 45 weeks (Flock C) giving a 9.8 and 9.7% improvement, respectively. The average egg weights were almost identical and only minor differences in egg quality were recorded. The laying curve (see Figure 1)

Table 1. *Comparative production data for an infected untreated flock (Flock A), an infected flock treated with tiamulin at 45 and 60 weeks of age (Flock B) and a flock treated at 25 and 45 weeks of age (Flock C)*

Parameter	Flock A	Flock B	Flock C	Comparison of Flock C with Flock A (%)
Number of birds housed	12 402	12 032	12 156	
Breed	Lohmann	Goldline	Goldline	
Eggs/hen housed	290.53	304.88	320.33	10.26
Eggs/hen housed at 72 weeks[a]	291.75	306.92	320.33	9.8
Egg weight (kg) at 72 weeks	18.59	19.63	20.40	9.7
Average egg weight (g)	63.71	63.96	63.68	−0.05
Feed consumption/day (g)	111.285	119.954	120.432	8.2
Total feed 20 to 72 weeks (kg)	40.50	43.66	43.83	8.2
Feed/egg conversion ratio	2.179	2.220	2.148	−1.42
Average bodyweight (kg) at sale	1.935	1.79	1.90	−1.3
Mortality (%)	13.84	7.11	5.25	−8.59
Peak laying (%)	91.5	90	94	2.5
Egg quality (%)				
Very large	4.93	6.00	5.32	0.39
Large	40.27	40.36	42.05	1.78
Medium	38.08	34.12	34.33	−3.75
Small	4.94	3.56	4.35	−0.59
Seconds	11.78	15.96	13.94	2.16

[a]Adjusted to 72 weeks of production for flock comparison data.

shows that Flock C had a higher and longer peak laying percentage than the control A and B flocks but interestingly Flock B's performance tended to follow Flock C's performance following tiamulin treatment.

The average feed intake of Flock A (control) was lower, which affected egg production; however, somewhat surprisingly, the average hen bodyweight in Flock A (control) was higher than both the Goldline flocks, and Flock B would be considered very low for the breed at that age. Mortality in Flock A was substantially higher than Flocks B and C by 6.73 and 8.59%, respectively. This would have had a marked effect on the flock's overall performance when judged on a hen/housed basis.

To take into account the breed variation, the laying flocks were compared with their own breed standards. Flock A (untreated Lohmann flock) was compared with the Lohmann Brown standard performance data and laying curve for caged birds (see Table 2 and Figure 2). Flocks B and C, which received tiamulin treatment, were compared with the Bovans Goldline caged-bird standard production figures (see Table 3 and Figure 3).

Figure 2 demonstrated that Flock A started laying 2 weeks earlier than the standard and did not quite reach the normal peak of 94.5%, but only 91.5% (−3%). However, the major difference was the subsequent performance up to 72 weeks where there was a major divergence in production, and Flock A was down to 60% and the standard was 77.6% (−17.6%). Overall, Flock A produced 18.7 (−6%) fewer eggs than the standard and almost 1 kg less in egg weight (−5.39%). Feed consumption was reduced by 2.03% in Flock A and the overall feed/egg conversion ratio (FCR) was worse by 3.56%. The most striking feature was the increased mortality rate of 13.84% in comparison with the flock standard of 5% (+8.84%).

Flock C (treated at 25 and 45 weeks of age) by contrast, mirrored fairly closely the Goldline standard laying curve. Peak production was 1% lower at 94%, but otherwise it followed the laying curve right up to

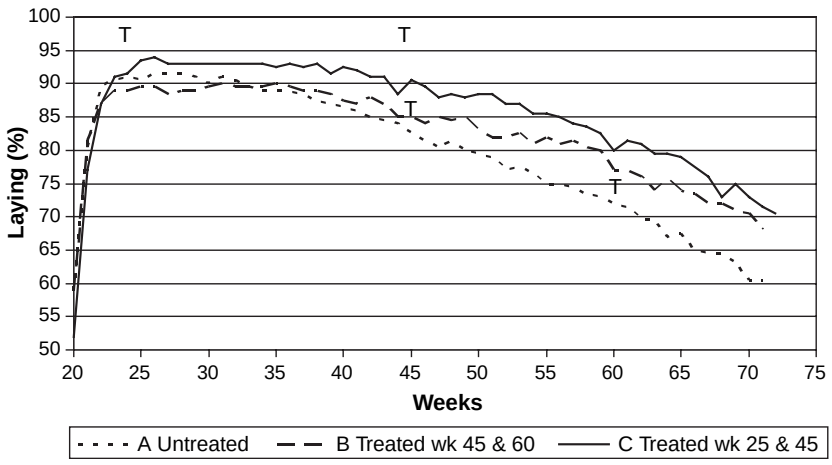

Figure 1. *Comparative laying curves of an infected untreated flock (Flock A), an infected flock treated with tiamulin at 45 and 60 weeks of age (Flock B), and a flock treated at 25 and 45 weeks of age (Flock C). T, tiamulin treatment of Flocks B and C.*

Table 2. *Comparative production data for a B. pilosicoli-infected untreated flock (Flock A) and the Lohmann Brown caged hen standard to 72 weeks of age*

Parameter	Flock A	Lohmann Brown standard data to 72 weeks	Comparison of Flock A with flock standard (%)
Breed	Lohmann	Lohmann	
Eggs/hen housed at 72 weeks[a]	291.75	310.4	−6.0
Egg weight (kg) at 72 weeks	18.59	19.65	−5.39
Average egg weight (g)	63.71	63.30	0.65
Feed consumption/day (g)	111.285	113.600	−2.03
Total feed 20 to 72 weeks (kg)	40.50	41.35	−2.06
Feed/egg conversion ratio	2.179	2.104	3.56
Average bodyweight (kg) at sale	1.935	1.900	1.84
Mortality (%)	13.84	5	8.84
Peak laying (%)	91.5	94.5	−3.0

[a]Adjusted to 72 weeks of production for flock comparison data.

65 weeks when there was a small drop in production by 72 weeks of 4%. Overall, Flock C laid 7.3 more eggs than the standard (+2.34%) and because the average egg weight was also higher, produced 0.8 kg (+5.15%) higher egg weight. Feed consumption was noticeably higher by almost 3 kg and the FCR was therefore worse by 1.8%. The mortality rate was similar to the standard, only 0.25% higher.

Flock B, which was treated midway (week 45) and at week 60, showed a lower productivity than standard throughout the laying period. Peak laying percentage was down by 5% from standard and this continued for the rest of the laying period. Egg production was 1.94% lower than standard (−6.1 eggs) but average and total egg weight was higher by 3.19 and 1.19%, respectively. Feed consumption was higher than standard and the FCR was worse by 5.21%. Mortality was 2.22% higher than standard.

The comparative differences of the effects of the disease and treatments with the breed effect removed are summarized in Table 4. There was a graded response to treatment, with the untreated birds (Flock A) showing a 6% reduction in the number of eggs produced per hen housed to week 72, the late-treated birds (Flock B) showed a 1.94% drop and the early treated birds (Flock C) a 2.34% increase. The drop in egg production of 6% in the untreated group is closer to the 5% drop described by Swayne (2003). There was also a graded response to total egg weight. With regard to total feed intake there was less of a graded effect but more of a breed effect, with Goldline flocks consuming substantially more. There was no graded effect on the FCR but both Flocks A and B had a higher FCR variation then Flock C. The average bodyweight was very variable and breed related. Both the Goldline flocks were lower than the standard for the breed. There was a marked difference between the breeds at 72 weeks of lay, with Lohmann flocks meant to be 1.9 kg (declining from a high of 1.95 kg at 54 weeks) and Goldline flocks 1.99 kg bodyweight (increasing from 1.97 kg at 54 weeks). There was a graded response to mortality, with the untreated flock showing a substantially higher rate than the other two treated flocks. The peak laying percentage was lower in the untreated flock (Flock A) as well as Flock B, which was not treated until much later at week 45, than the early treated Flock C (25 weeks of age), which suggests the infection could well be having an impact on this parameter.

Unfortunately, no statistical analysis of these data was considered possible due to the lack of replication of the flocks and treatments.

Discussion

B. pilosicoli is meant to be associated with a mild intestinal infection in laying birds with a drop of 5% in egg production and no impact on mortality (Swayne, 2003). However, if the condition is undiagnosed and untreated and lasts for the full length of the laying period, the effect seen was a 6% reduction in egg

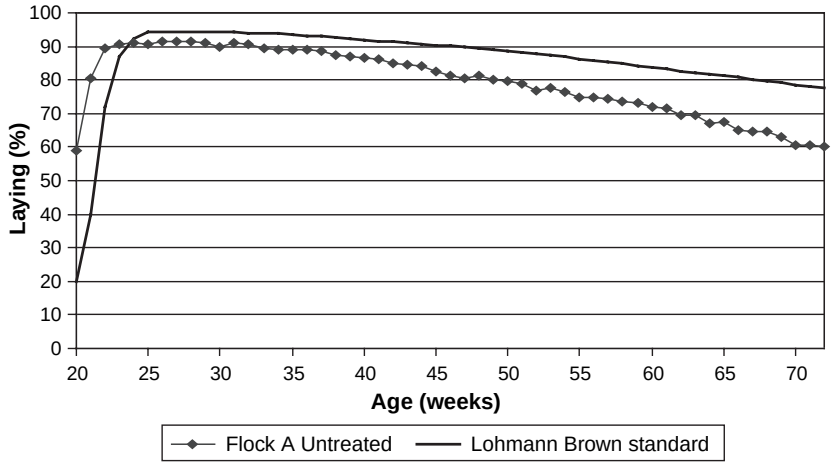

Figure 2. *Comparative laying curves of the infected untreated flock (Flock A) and the Lohmann Brown standard.*

Table 3. *Comparative production data for tiamulin-treated flocks (Flocks B and C) and the Bovans Goldline caged hen standard to 72 weeks of age*

Parameter	Flock B, treated weeks 45 and 60	Flock C, treated weeks 25 and 45	Bovans Goldline standard data to 72 weeks	Comparison of Flock B with Goldline standard (%)	Comparison of Flock C with Goldline standard (%)
Breed	Goldline	Goldline	Goldline		
Eggs/hen housed at 72 weeks[a]	306.92	320.33	313	−1.94	2.34
Egg weight (kg) at 72 weeks	19.63	20.40	19.40	1.19	5.15
Average egg weight (g)	63.96	63.68	61.98	3.19	2.74
Feed consumption/day (g)	119.954	120.432	112.362	6.76	7.18
Total feed 20 to 72 weeks (kg)	43.66	43.83	40.90	6.75	7.16
Feed/egg conversion ratio	2.22	2.148	2.110	5.21	1.8
Average bodyweight (kg) at sale	1.79	1.90	1.99	−10.05	−4.74
Mortality (%)	7.11	5.25	5.0	2.11	0.25
Peak laying (%)	90.0	94.0	95.0	−5.0	−1.0

[a]Adjusted to 72 weeks of production for flock comparison data.

production and an increase of mortality by 8.84%. The mortality did not appear to be directly related to the *B. pilosicoli* infection, because it appeared to be associated with peritonitis caused by *E. coli*, but might be indirectly associated with the chronic debilitating stress of a chronic intestinal infection. It was not thought to be associated with the *M. synoviae* infection, although *E. coli* infections are commonly secondary to mycoplasmal infections, because this high level of mortality was not seen in other flocks, which also had *M. synoviae* infections and were controlled in the main by chlortetracycline medication. These factors demonstrate the chronic insidiousness of *B. pilosicoli* infections and highlight that, where there is a low grade level of diarrhoea, poor production and an increased mortality, spirochaetosis should be considered as a differential diagnosis.

Because chlortetracycline at 600 parts/10^6 in feed had no effect on the condition, in spite of repeated use, tiamulin was considered the next suitable alternative in layers, as it also has a zero withdrawal period for eggs in the United Kingdom. Tetracycline appears to have a moderate activity *in vitro* against *B. pilosicoli*, with an MIC_{90} below 5 μg/ml (Hampson & Stephens, 2002); but as gut pharmacokinetic and pharmacodynamic data are not available for chickens, a suitable microbiological breakpoint could not be determined and it is suspected that the organism was resistant to chlortetracycline. The dose of tiamulin used (12.5 mg/kg bodyweight) was lower than the one indicated for mycoplasma treatment in the United Kingdom (25 mg/kg bodyweight) and by Stephens & Hampson (2002b), but higher than the level used in pigs for *B. hyodysenteriae* infections (8.8 mg/kg bodyweight). There are also no data available for gut pharmacokinetics of tiamulin in chickens to establish a breakpoint, but a positive clinical response was achieved. Unfortunately, no faecal samples were taken directly after treatment to determine whether the organism had been eliminated from the gut, as it was a field case. However, previous work by Stephens & Hampson (2002b) showed that indeed the organism was promptly removed from the birds following treatment and did not return within the 4-week observation period. At necropsy the organisms were also not recovered, unlike in the untreated controls. The birds were kept in cages in this field study, which tend to reduce faecal contamination and reduce the opportunities for re-infection, unlike free-range or barn-reared flocks, but a further application of tiamulin was given some months after the initial treatment as a precaution against re-infection.

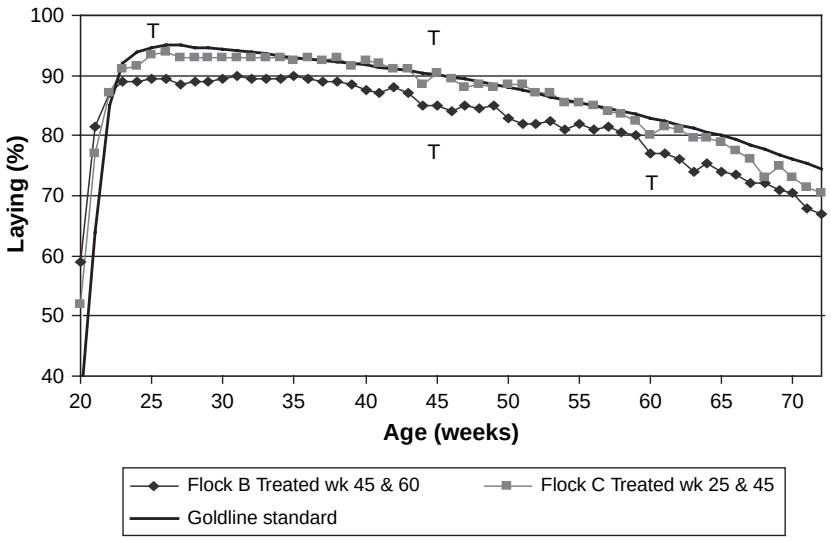

Figure 3. *Comparative laying curves of the tiamulin-treated flocks (Flocks B and C) and the Bovans Goldline standard. T, tiamulin treatment of Flocks B and C.*

Table 4. *Comparison of individual flock variations (%) from their breed standard*

Parameter	Flock A, infected and untreated	Flock B, treated weeks 45 and 60	Flock C, treated weeks 25 and 45
Breed	Lohmann	Goldline	Goldline
Eggs/hen housed at 72 weeks[a]	−6.0	−1.94	2.34
Egg weight (kg) at 72 weeks	−5.39	1.19	5.15
Total feed 20 to 72 weeks (kg)	−2.06	6.75	7.16
Feed/egg conversion ratio	3.56	5.21	1.8
Average bodyweight (kg) at sale	1.84	−10.05	−4.74
Mortality (%)	8.84	2.11	0.25
Peak laying (%)	−3.0	−5.0	−1.0

[a]Adjusted to 72 weeks of production for flock comparison data.

The cause of the spread of the disease from flock to flock on this multi-age site was not established but was thought to be most probably caused by mechanical transmission, probably by flies but mice or other carriers could be involved. It was not affected by the season and continued all year round. Bano *et al.* (2005) also reported that it was more common (86%) in birds older than 40 weeks of age than birds between 20 and 40 weeks of age (47%), and this was also found by Stephens & Hampson (1999). Birds kept in sheds with a deep pit system for droppings had a prevalence of 89%, in comparison with 58% for a conveyor belt system and frequent removal.

It is interesting that two recent surveys in Australia and Italy (Stephens & Hampson, 1999; Bano *et al.*, 2005) have shown a much higher prevalence of the potentially pathogenic spirochaetes *B. pilosicoli and B. intermedia* than previously considered by the Dutch study (Dwars *et al.*, 1989); this could be explained by differences in the techniques used. Dwars *et al.* (1989) used a direct FAT on samples sent into the laboratory, whereas the others used a faecal sampling and culture technique followed by a polymerase chain reaction test for isolate identification purposes. Both the Australian and Italian surveys showed that the prevalence of spirochaetes was about 70% (68 to 72%) and approximately one-half of those farms had pathogenic isolates of *B. pilosicoli* and *B. intermedia* (34 to 31%, respectively). Swayne (2003) reported that the potential economic impact of the disease has not been estimated. However, in the United Kingdom, with a national flock of approximately 30 million hens and potentially 30% of flocks infected that have a depression of egg production of 5% and an egg value of 3 p/egg, then a figure of approximately £14 million can be estimated as the potential loss to the UK commercial laying industry, or 1.5% of production.

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Non-English Abstracts

Treatment of a field case of avian intestinal spirochaetosis caused by *Brachyspira pilosicoli* with tiamulin

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Traitement à la tiamuline d'un cas terrain de spirochétose intestinale aviaire causé par *Brachyspira pilosicoli*
Il y a eu beaucoup de confusion sur la signification de la présence de spirochètes dans les cæca de poules pondeuses et sur l'impact qu'ils pouvaient avoir sur la production d'æufs. Ces dernières années, la situation est devenue plus claire et il a été démontré que la présence d'espèces comme *Brachyspira pilosicoli* entraînait une maladie chronique et bénigne chez les pondeuses et les reproductrices et réduisait la production d'æufs de 5 pour cent. Au Royaume Uni, une ferme multi âge de pondeuses en cage, comprenant trois troupeaux séparés d'environ 12.000 sujets chacun, était chroniquement infectée par *B. pilosicoli* mais montrait peu de symptômes à l'exception d'une diminution évidente de la production d'æufs et une augmentation de la mortalité. Les troupeaux ont reçu un traitement à la tiamuline à la dose de 12,5mg/kg de poids vif, dans l'eau de boisson durant 3 jours et une amélioration stable des performances a été enregistrée. Les résultats de production ont été comparés à ceux d'un troupeau témoin qui n' a pas été traité préalablement à la tiamuline et à un autre troupeau qui avait été traité aux âges de 25 et 45 semaines. Pour le troupeau traité à la tiamuline, comparé au témoin non traité, il a été enregistré une amélioration de 9,8% de la production d'æufs par poule hébergée jusqu'à l'âge de 72 semaines, et de 9,7% du poids total des æufs, ainsi qu'une réduction de 8,6% de la mortalité. Après avoir tenu compte de la différence des souches commerciales utilisées, le troupeau non traité, comparé aux données standard de production de la souche, a présenté seulement une réduction de 6% de la production d'æufs mais une augmentation de 8,84% de la mortalité. Le coût de la maladie a été estimé à 14 millions de £ au RU basé sur les 30 millions de pondeuses au niveau national, soit 1,5% de la production. La recherche au niveau des fèces de spirochètes potentiellement pathogènes devrait faire partie du diagnostic différentiel pour les troupeaux de poules pondeuses qui ont des performances en dessous du standard de la souche.

Behandlung eines Feldfalls von durch *Brachyspira pilosicoli* verursachten aviären intestinalen Spirochätose mit Tiamulin
Es hat viel Verwirrung über die Bedeutung von Spirochäten im Zäkum von Legehennen und ihre Auswirkung auf die Eiproduktion gegeben. Untersuchungen in den letzten Jahren haben jedoch zur Aufklärung der Situation beigetragen und gezeigt, dass das Vorkommen einer Spezies wie *Brachyspira pilosicoli* sowohl bei Legehennen als auch bei Elterntieren zu einer milden chronischen Erkrankung und zu einem Rückgang der Legeleistung um 5% führt. In Großbritanien war ein Käfighaltungsbetrieb mit mehreren Altersgruppen und drei getrennten Herden von ungefähr jeweils 12000 Legehennen chronisch infiziert mit *B. pilosicoli,* zeigte jedoch kaum klinische Symptome außer einem Legeleistungsrückgang und erhöhter Mortalität. Die Herden wurden drei Tage lang über das Trinkwasser mit Tiamulin in einer Dosis von 12,5 mg/kg Körpergewicht behandelt, was zu einem beständigen Anstieg der Leistung führte. Die Leistungsdaten wurden mit denen einer unbehandelten Kontrollherde und denen einer Herde verglichen, die im Alter von 25 und 45 Wochen behandelt worden war. In der mit Tiamulin behandelten Herde wurde im Vergleich mit der unbehandelten Kontrolle eine Steigerung der Eiproduktion/Henne bis zur 72. Lebenswoche um 9,8% und eine Erhöhung der totalen Eigewichte um 9,7% sowie ein Rückgang der tatsächlichen Hennenmortalität um 8,6% festgestellt. Bei den Zuchttieren zeigte die unbehandelte Herde beim Vergleich mit den individuellen Standardzuchtproduktionsdaten nur eine Reduktion der Legeleistung um 6%, aber eine Anstieg der Mortalität um 8,84%. Die Kosten aufgrund dieser Erkrankung wurden insgesamt für Großbritanien bei 30 Millionen Legehennen auf £ 14 Millionen oder 1,5% der Produktion geschätzt. Die Untersuchung von Fäzes auf potentiell pathogene Spirochäten sollte ein Teil der Differentialdiagnose bei Legehennenherden mit Leistungsrückgang sein.

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Tratamiento con tiamulina en un caso clínico de espiroquetosis intestinal aviar causada por *Brachyspira pilosicoli*

Ha existido gran controversia respecto la significación de la presencia de espiroquetas en los ciegos de gallinas ponedoras y el impacto que éstas podrían tener en la puesta. En los últimos años, la situación se ha aclarado y se ha demostrado que la presencia de especies de *Brachyspira pilosicoli* produce una enfermedad crónica leve tanto en ponedoras como en reproductoras y se han descrito caídas de puesta de hasta un cinco por ciento. En Reino Unido, una granja de gallinas ponedoras multiedad con tres lotes separados de 12,000 aves cada uno aproximadamente, estaba infectado de manera crónica con *B. pilosicoli* aunque mostraba poca sintomatología clínica, a excepción de una reducción notable de la puesta y un incremento de la mortalidad. Se trataron los lotes durante tres días con tiamulina a 12.5mg/kg de peso vivo en agua de bebida, y se observó un incremento constante en el rendimiento. Se compararon los resultados productivos con los de un lote que no había sido tratado con tiamulina previamente, como control, y con los de un lote que se había tratado a las 25 y 45 semanas de vida. Se describió una mejora del 9,8% en la puesta/gallina alojada a las 72 semanas de vida y del 9,7% en el peso total del huevo, así como una reducción del 8,6% en la mortalidad, en el lote tratado con tiamulina en comparación con el control no tratado.

Tras tener en cuenta las diferentes estirpes utilizadas, la caída de la puesta en el lote no tratado tan sólo fue del 6%, pero el incremento de mortalidad en este mismo lote fue del 8.84% en comparación los datos de producción estándar de la raza. El coste de la enfermedad se valoró en 14 millones de £ en UK en base a una población nacional de 30 millones de aves, o en un 1.5% de la producción. El análisis coprológico para determinar la presencia de espiroquetas potencialmente patógenas debería incluirse en el diagnóstico diferencial en aquellos lotes de puesta que muestren baja productividad.