SURVEY OF 222 FLOCKS IN GREAT BRITAIN FOR THE PRESENCE OF BRACHYSPIRA SPECIES AND THEIR EFFECT ON PRODUCTION

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Introduction and Objectives

An early report in Great Britain (GB) (1) demonstrated that a spirochaete infection in pullets, reared on deep litter and with a close proximity to pigs, was associated with poor growth rates, immaturity and delayed onset of egg production. Following the recent discovery of various *Brachyspira* species on laying farms in GB (2; 3) and the observation that their presence was often associated with poor egg production and increased mortality, a major laying group decided to carry out an extensive survey of their farms to determine the prevalence of *Brachyspira* infections. They looked primarily at laying flocks, which were mainly free range and caged both with deep-pit and belt-clean systems but also in breeders and rearing pullets. The prevalence of the different species of *Brachyspira* was recorded and subsequently, it was decided to assess their potential association with laying performance.

Materials and Methods

Pooled faecal samples or samples of caecum and caecal contents from culled birds were collected from the group's 222 flocks between March 2007 and June 2008 and sent to the local regional Veterinary Laboratories Agency (VLA) for routine *Brachyspira* enrichment culture. Any *Brachyspira* spp thus isolated were sent to VLA Winchester for speciation, using biochemical tests. The presence/absence of *Brachyspira* spp and the age of the flock (in weeks) when the samples were taken were recorded. Cultures were classified as 'unidentified' if organisms typical of *Brachyspira* spp were seen on dark background microscopy of fresh caecal contents but then attempts to isolate them proved unsuccessful or if their biochemical profiles were equivocal**.** At the end of the survey the overall production of the flocks was assessed, where the data was available, based on the number of eggs produced/hen housed (HH). On target was 285 eggs/HH (O); below target was <280 eggs/HH (B) and above was >290 eggs/HH (A). The results were analysed using Microsoft Excel and STATA v10.0.

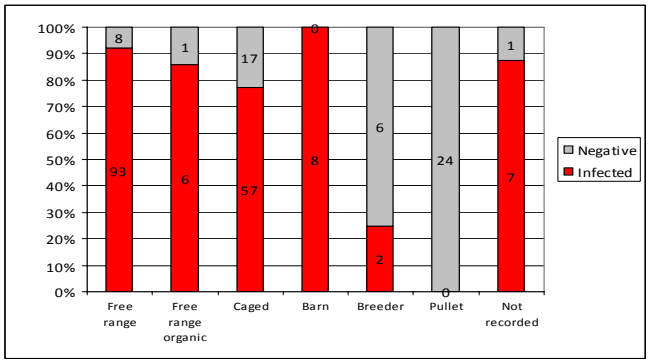
Results

From the 222 flocks sampled, culture results were available for 221 farms. There was a total of 230 *Brachyspira* spp isolates; 7 free range and 2 caged farms had multiple *Brachyspira* spp isolates. Eight laying farms did not record their type. Data were examined on the presence or absence of each *Brachyspira* spp.

Table 1. Isolation of *Brachyspira* spp by farm type (number of flocks)

	No isol.	Free range & organic (101)	Caged (72)	Breed (8)	In rear pullet (24)
B. innocens	56	35	17	0	0
B. hyodys.	2	0	2	0	0
B. intermedia	36	23	8	1	0
B. murdochii	23	6	12	1	0
B. pilosicoli	20	8	11	0	0
Unidentified	36	27	7	0	0
Negative	57	9	17	6	24
Totals	230	108	74	8	24
Negative(%)		*8%*	*24%*	*75%*	*100%*
Positive(%)		*92%*	*76%*	*25%*	*0%*

Figure 1. Isolation of *Brachyspira* spp by farm type

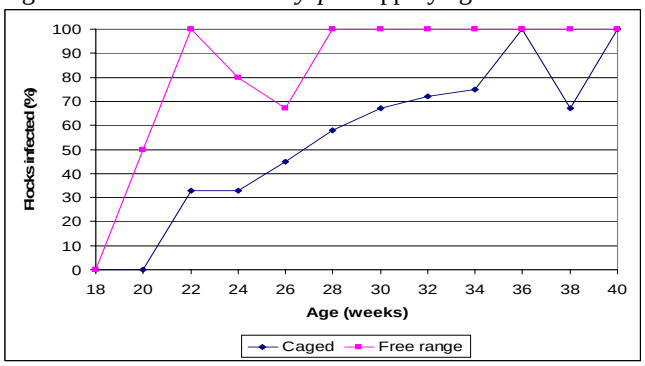


No *Brachyspira* spp were found in flocks of in-rear pullets prior to placement, infrequently in breeders (25%), but were readily isolated in caged flocks (76%), free range (91%), organic free range (86%) and barns (100%) (see Table 1 and Figure 1).

The isolation of *Brachyspira* spp by age of flock was also analysed. *Brachyspira* spp were found in pullets after placement from 16 weeks of age and the incidence increased

with age. If the data were broken down to 2-week segments, free-range flocks could be fully infected with *Brachyspira* spp as early as 22 weeks of age (6/6 flocks) and caged flocks were generally later, by 36 weeks of age (2/2 flocks), whether from deep-pit or belt-clean houses.

Figure 2. Isolation of *Brachyspira* spp by age of flock

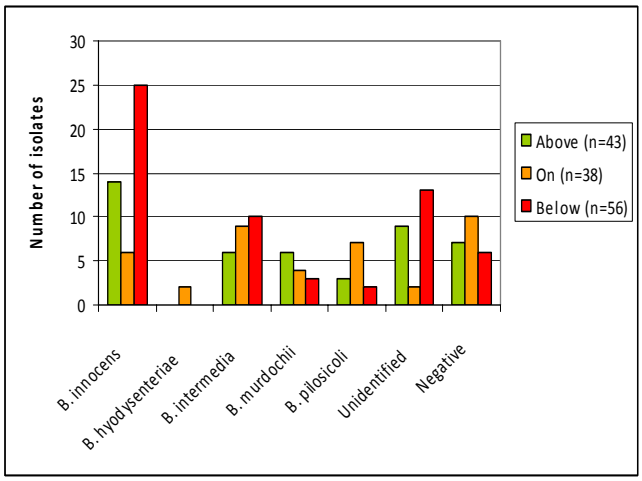


The effects of the different *Brachyspira* spp on production are shown in Table 2 and Figure 3 and are based on 137 flocks where the production data was available.

Table 2. *Brachyspira* spp isolates from above, on or below performance flocks (Data available from 137 flocks)

	Above target (n=43)	On target (n=38)	Below target (n=56)
B. innocens	14	6	25
B. hyodysenteriae	0	2	0
B. intermedia	6	9	10
B. murdochii	6	4	3
B. pilosicoli	3	7	2
Unidentified	9	2	13
Negative	7	10	6
Totals	45	40	59

Figure 3. Effects of *Brachyspira* spp. on laying performance. Data from 137 flocks



Key: On target 285 eggs/HH (O); below target was <280 eggs/HH (B) and above was >290 eggs/HH.

Multivariable analysis using type of flock, production level and *Brachyspira* spp variables showed: -

- Free range (free range and free range organic) flocks had poorer production (below target vs on and above target) than caged flocks (odds ratio 0.12; confidence interval 0.05-0.30).
- *B. innocens* was more likely to be associated with poor performance in all flocks (odds ratio 2.31; confidence interval 1.02-5.26), but especially in free range (free range and free range organic) (odds ratio 4.24; confidence interval 1.44-12.49).
- In caged flocks, *B. intermedia* were more likely to be associated with poor production (below vs on and above target) (odds ratio 7.20; confidence interval 1.13-4.60).
- It also showed that *B. intermedia* were associated with on or above target egg production in free-range flocks (odds ratio 3.11; confidence interval 1.00-9.66).

Conclusions

(i) *Brachyspira* spp were commonly found in this layer group's survey of flocks – 76% in cages and 91% free range and 86% of free range organic)

(ii) No *Brachyspira* spp were found in in-rear flocks prior to placement, although infections were found following placement

(iii) Free-range laying flocks could be found to be fully infected (that is 6/6 samples cultured positive) as early as 22 weeks of age and caged flocks generally later by 36 weeks

(iv) In this survey, free-range flocks were significantly associated with poor performance in comparison with caged flocks

(v) In this survey, *B. innocens* was significantly associated with below target egg production in free-range flocks and *B. intermedia* in caged flocks

(vi) Conversely, *B. intermedia* was associated with increased production in free-range flocks and this may have been due to treatment of these flocks. Further work into the effects of *Brachyspira* spp in free-range flocks should be considered.

Acknowledgements

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References

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3. Thomson, J. R. et al, (2007) Proc 4th ICCSIAH Conf. Prague, Czech R. Abst. 39