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Observations on the Pathology of Tuberculosis in Badgers

J. J. O'Keeffe, I. O'Boyle[1] and U. Fogarty[2]

Introduction

The role of the badger in the spread of bovine tuberculosis in Ireland has been the subject of many research projects. In the course of investigations into herd breakdowns local badger populations are examined for evidence of tuberculosis. In one laboratory where these post mortem examinations are performed, the Irish Equine Centre (IEC), additional data were collected from the material submitted for examination.

Materials and Methods

The results of the 88 *post-mortem* examinations carried out at the ERC during 1995 and a further 280 carried out during 1996 were computerised at the TIU and analysed. Badgers were supplied by eight District Veterinary Office (DVO) areas (Table 1).

Table 1. Geographic area from which sample is drawn

District Veterinary Office Area	No. Badgers Supplied (%)
Cork South	29 (7.9%)
Donegal	13 (3.5%)
Galway	71 (19.3%)
Kildare	2 (0.5%)
Longford	93 (25.3%)
Mayo	6 (1.6%)
Offaly	22 (6.0%)
Roscommon	132 (35.9%
Totals	368

Results

Four cadavers were decomposed and consequently were unsuitable for post-mortem examination. The analysis is carried out on data recorded for the remaining 364 cadavers. Records with missing values are excluded where they arise.

Table 2. Age profile of badgers

Age	No. Badgers (%)
Adult	320 (88.0%)
Cub	42 (12.0%)
Total	362

Table 3. Sex of badgers

Sex	No. of Badgers (%)
Female	184 (50.5%)
Male	180 (49.5%)
Total	364

The sample of badgers which were predominantly adults (Table 2) contained almost equal numbers of males and females (Table 3)

The badgers were assessed subjectively for condition and were rated as being in either good, fair or poor body condition. There was no significant difference in the weights between the animals in the three groupings (Table 4). As would be expected, adults were heavier than cubs ($p > 0.01\%$) (Table 5).

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Table 4. Weight by condition score

Condition	No. Badgers	Mean Weight (KGs)	S.D. (kg)
Good	351	9.43	1.77
Fair	9	8.74	1.05
Poor	4	8.02	0.95
Totals	364	9.6	3.9

Table 5. Weight by age

Age	No. of Badgers	Mean Weight (KGs)	S.D. (KGs)
Adult	320	9.6	1.7
Cub	42	7.9	1.3
Total	364	9.6	3.9

Of the 364 badgers examined, gross lesions were identified in 40 (10.9%). The lesion rate was higher in males than in females, but the difference was not statistically significant (Table 6).

(SD ±1.7). This difference was significant at the 10% level (P = 0.07).

The most common site of lesions was the thoracic cavity (bronchial and mediastinal lymph nodes and the lung tissue), followed by the carcass tissue (skin, prescapular, popliteal and axillary lymph nodes), followed by abdominal tissue (kidney, spleen, liver, hepatic and messenteric lymph nodes) followed by tissue from the head and neck area (pharyngeal, parotid and submandibular lymph nodes) as shown in Table 7.

Table 7. Site of gross lesions.

Site	Frequency (%)
Thoracic Cavity	16 (40.0%)
Carcass	8 (20.0%)
Abdominal Cavity	3 (7.5%)
Head/Neck Area	2 (5.0%)
Multiple Sites	11 (27.5%)
Total	40

Table 6. Post-mortem findings by sex

Gross PME/Sex	Female	Male	Totals
Positive	17 (9.2%)	23 (12.8%)	40 (11.0%)
Negative	167 (90.8%)	157 (87.2%)	324 (89.0%)
Total	184	180	364

The mean weights for lesion-positive adults was 10.2 kgs (SD ±1.8) compared to 9.5 kgs (SD ±1.7) for lesion negative adults. This difference was significant (P = 0.027). The difference between lesion-positive and lesion-negative female adults was 9.7 kgs (SD ±1.7) and 9.2 (SD ±1.7) respectively, which is not significant. Lesion-positive male adults, had a mean weight of 10.5 kgs (SD ±1.8) and were significantly heavier than lesion-negative males, which had a mean weight of 9.7 kgs

Lesions were confirmed histopathologically in 10 cases. Culture was undertaken in 4 cases, all of which were negative. The age of tissue samples received for examination at this laboratory would be on average between 2 and 4 days old.

Measurements were made of the length of claw in the front and hind limbs during each examination. It has been hypothesised that ill badgers dig less and consequently may have longer claws on

their forelegs than healthy badgers (Dr. P. Sleeman, Zoology Dept., UCC, personal communication). The length of claws in the fore and hind legs are tabulated in Tables 8 and 9.

Table 8. Length of claws on foreleg

Length of claws (mm)	Frequency (%)
<1.0	1 (0.3%)
1.0 - 1.4	16 (4.5%)
1.5 - 1.8	192 (53.6%)
1.9 - 2.2	127 (35.5%)
> 2.2	22 (6.1%)
Total	358

Table 9. Length of claws on hindleg

Length of claws (mm)	Frequency (%)
<0.5	260 (74.7%)
0.5 - 0.8	76 (21.8%)
> 0.8	12 (5.5%)
Total	348

The mean length of foreclaw in gross lesion-positive badgers was 1.89 mm (SD 0.33) compared to mean length 1.83 mm (SD 0.2.8) in gross lesion-negative badgers. This difference was not significant for a previous study Whelton (1991) found an association between foreclaw length and the presence of tuberculosis-like lesion in a sample of male badgers.

When the mean weights of badgers with foreclaw greater than 2.2 mm were compared with the remaining badgers there was no significant difference between the two groups (Table 10).

Table 10. Weights of badgers in groupings based on length of foreclaw

Length of foreclaw	Freq	Mean Weight (SD) kg.
Greater than 2.2 mm.	22	9.47 (±1.8)
2.2mm or less	336	9.38 (±1.78)
Totals	358	

Badgers which had a foreclaw longer than 2.2 mm. had a higher lesion rate than those whose foreclaw was 2.2 mm. or less (Table 11).

Conclusion

Data are presented on a sample of badgers examined in a private sector laboratory. The results are in line with previously recorded data from State laboratories. The observation in relation to the length of foreclaw as a predictor of lesion status of badgers warrants further examination using a larger sample. A study on tuberculosis in possums in New Zealand (Lugton, 1997) indicated that possum carcases taken from sites with a high prevalence of tuberculosis had the highest mean weights. Further data using a larger sample will be used to examine the corresponding relationship in badgers.

Table 11. Lesion rate vs. length of foreclaw.

Gross lesion/foreclaw	2.2 mm or less	More than 2.2 mm.	Totals
Positive lesion	34 (10.1%)	5 (22.7%)	39 (10.9%)
Negative lesion	302 (89.9%)	17 (77.3%)	319 (89.1%)
Totals	336	22	358

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