Veterinary Parasitology 200 (2014) 212–215

Contents lists available at ScienceDirect

Veterinary Parasitology

journal homepage: www.elsevier.com/locate/vetpar

Short Communication

Further studies on the necessity or otherwise of multiple pre-treatment groups in faecal egg count reduction tests in sheep

P.B. McKenna*

Gribbles Veterinary, P.O. Box 536, Palmerston North, New Zealand

ARTICLE INFO

Article history:
Received 11 October 2013
Received in revised form
13 November 2013
Accepted 13 November 2013

Keywords:
Sheep
Nematode
Faecal egg count reduction test
Anthelmintic resistance

ABSTRACT

Data utilised in a previous study to compare two different faecal egg count reduction tests (FECRTs) in sheep involving multiple anthelmintic treatments and undifferentiated faecal egg counts (FECs), were re-examined using FECs for individual parasite genera. The first of these FECRTs was based on changes in the pre- and post-treatment FECs of the same groups of animals. The other represented an abbreviated version of the former procedure and involved only a single common pre-treatment group as a baseline for comparing all post-treatment results. A comparison of the results obtained with these two procedures showed that the use of either one of them was likely to provide similar estimates of anthelmintic efficacy and the detection of a comparable number of cases of anthelmintic-resistance for all parasite genera. These findings offer further support to a previously expressed view that the use of the more complex and costly pre- and post-treatment FECRT procedure is unlikely to provide any real advantages over the simpler one.

1. Introduction

In a recent communication (McKenna, 2013), a comparison was made between two different methods for calculating the results from faecal egg count reduction tests (FECRTs) in sheep. Both were based on changes in the faecal egg counts (FECs) of only treated animals using arithmetic means. The first of these, referred to as FECRT3, involved the use of the formula $FECR = 100 \times (1 - T2/T1)$, where $T1$ and $T2$ represented the arithmetic mean pre- and post-treatment faecal nematode egg counts (FECs) of each treated group. The other, designated FECRT4, consisted of an abbreviated version of the former procedure and was represented by the formula $FECR = 100 \times (1 - T2/C1)$ where C1 represented the arithmetic mean of a single common pre-treatment group.

Where a multiplicity of drench types is involved, as is usually the case, the former test necessitates comparing the FECs of groups of animals sampled at the time of anthelmintic treatment (pre-treatment) with the same animals sampled several days later (post-treatment). FECRT4, on the other hand, uses only a single common pre-treatment group ($C1$) as a baseline for comparing all post-treatment results. Although the latter test is thus simpler and less expensive than the FECRT3 procedure, the results of the comparative study referred to above (McKenna, 2013), suggested that any improvements in accuracy and reliability that might supposedly be obtained by the use of the FECRT3 procedure were likely to be largely illusory.

Nowadays, FECRTs are frequently combined with the results of larval culture to enable estimates of anthelmintic efficacy to be determined for individual nematode genera (McKenna, 1997). The results of the McKenna (2013) study, however, were based solely on the use of undifferentiated FECs and could, therefore, be justifiably criticised on these

* Tel.: +64 06 356 7100; fax: +64 06 357 1904.
E-mail address: phil.mckenna@gribbles.co.nz

0304-4017/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.vetpar.2013.11.009

grounds. Accordingly, the present study was undertaken to further examine these data using FECRTs obtained for each individual parasite genus.

2. Materials and methods

The study was based on a re-examination of those FECRT case submissions used by McKenna (2013) but involved comparisons of FECRs for individual parasite genera rather than the undifferentiated FECs employed in that investigation. As in the previous study, these consisted of a total of 39 FECRTs involving the testing of between 2 and 7 anthelmintics on each occasion undertaken according to the FECRT3 procedure using arithmetic means.

The occurrences and identities of worm genera other than *Nematodirus*, which was excluded from the study, were determined from pooled pre- and post-treatment larval cultures incubated at 27 °C for 7 days. The percentage generic composition of these cultures, as determined from an examination of a random sample of 100 larvae, was then used to calculate the arithmetic group mean FECs and FECRs for the individual nematode genera represented in each case. No effort was made to differentiate between the infective larvae of *Oesophagostomum* and *Chabertia*, however, and their eggs were regarded as one. For each individual parasite genus an arithmetic mean pre-treatment FEC qualifying criterion of at least 50 epg was applied; genera with pre-treatment FECs of less than this being regarded as absent.

In each case, the percentage reductions determined for each parasite genus using the pre- and post-treatment egg counts of the same treatment group (matched FECRs) were compared to those obtained using the pre-treatment FECs of each of the other treatment groups (unmatched FECRs) as previously described (McKenna, 2013). These former calculations were considered to be representative of those FECRs that would be obtained using the FECRT3 methodology, the latter those that might otherwise have been achieved by using a randomly selected group of animals to provide a single pre-treatment baseline for comparing all post-treatment results as in the FECRT4 procedure. Resistant parasite genera were identified as those where anthelmintic treatment failed to reduce their pre-treatment egg counts by at least 95% with FECRs of ≥95% being considered to represent anthelmintic-susceptibility. Finally, because the same result would always be achieved regardless of what FECRT methodology was used, FECRTs of 100% were excluded from consideration.

3. Results and discussion

Information relating to the FECRS and to the numbers of the various parasite genera identified as drench-resistant in both matched and unmatched FECRs as well as measures of the closeness of the associations between their individual comparisons, are presented in Tables 1 and 2. An examination of these comparisons showed that the use of either procedure was likely to result in similar estimates

Table 1
Comparison of results obtained using matched and unmatched FECRs for individual parasite genera recorded in previously published FECRTs in sheep (McKenna, 2013) (excluding FECRs of 100%).

	Haemonchus		Teladorsagia		Trichostrongylus		Cooperia		Oesoph/Chabertia	
	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched	Matched	Unmatched
Mean % FECR (range)	95.7 (77.8–99.6)	95.1 (73.1–99.8)	77.9 (0.0–99.9)	77.4 (0.0–99.9)	81.5 (0.0–99.9)	81.8 (0.0–99.9)	89.3 (44.5–99.9)	87.7 (0.0–99.9)	90.9 (32.9–99.7)	90.8 (13.7–99.8)
No. of Res cases (%)	11 (27.5)	10 (25.0)	219 (70.6)	217 (70.0)	280 (52.1)	288 (53.6)	87 (46.0)	82 (43.4)	45 (45.5)	43 (43.4)
Total cases	40	40	310	310	537	537	189	189	99	99
Correlation[a]	0.9605			0.9571		0.9507		0.9318		0.9806

[a] Correlation (Pearsons) between matched and unmatched FECRs.