Veterinary Parasitology 204 (2014) 269–278

Contents lists available at ScienceDirect

Veterinary Parasitology

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

Descriptive findings from analysis of a large database of cattle worm egg count and larval culture results collected across Australia between 2002 and 2012

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ARTICLE INFO

Article history:
Received 23 November 2013
Received in revised form 17 April 2014
Accepted 18 April 2014

Keywords:
Worm egg count
WEC
Cattle
Internal parasites
Worm genus distribution
Australia

ABSTRACT

Results from worm egg counts (WECs) of cattle from across Australia over an 11 year period have been analysed to provide contemporary data on WEC and worm genus distribution in Australian cattle.

A sampling kit consisted of ten sample containers. Faecal samples were collected into each sampling kit from groups of cattle and WEC and larval cultures were conducted using standard procedures. A submission form was completed for each kit with data requested including date of sampling, property address, age, average estimated weight and production type of cattle, last drench used and date of drenching. Regional analysis was done by postcode region and postcode regions were grouped into bioclimatic regions.

A total of 5069 submissions were received from 2002 to the end of 2012 representing over 50,000 individual faecal samples. Seventy-seven percent of cattle sampled were no more than 2 years of age with the remainder representing a range of age groups. Samples were collected from all of the significant cattle producing regions of Australia.

There was a tendency for higher geometric mean WEC in cattle in northern Australia and in high rainfall areas along the east coast of Australia. Geometric mean WEC for bioclimatic regions varied seasonally with a peak in autumn in regions with summer dominant rainfall, but little seasonal variation in regions with winter dominant rainfall patterns.

Worm genera cultured varied throughout Australia with *Cooperia* spp. being most prevalent across the country, followed by *Haemonchus* spp. and *Oesophagostomum* spp. in summer rainfall dominant regions and *Ostertagia* spp. and *Trichostrongylus* spp. in winter rainfall regions. In the coastal, tablelands, and temperate rangelands regions of NSW, *Haemonchus* spp. were as prevalent as *Cooperia* spp. during autumn months and levels of *Haemonchus* spp. found in south-western Western Australia were higher than previously documented.

These data provide an up-to-date summary of internal parasites in Australian cattle. Regional differences in WEC between northern and southern Australia are evident and should be further explored. These data suggest that there has been a move to *Cooperia* spp. being the predominant worm genus in Australian cattle, with increasing levels of *Haemonchus* spp. being evident in southern temperate regions of Australia.

1. Introduction

Worm egg count (WEC) testing has been widely used in Australia and around the world to determine whether

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http://dx.doi.org/10.1016/j.vetpar.2014.04.029
0304-4017/

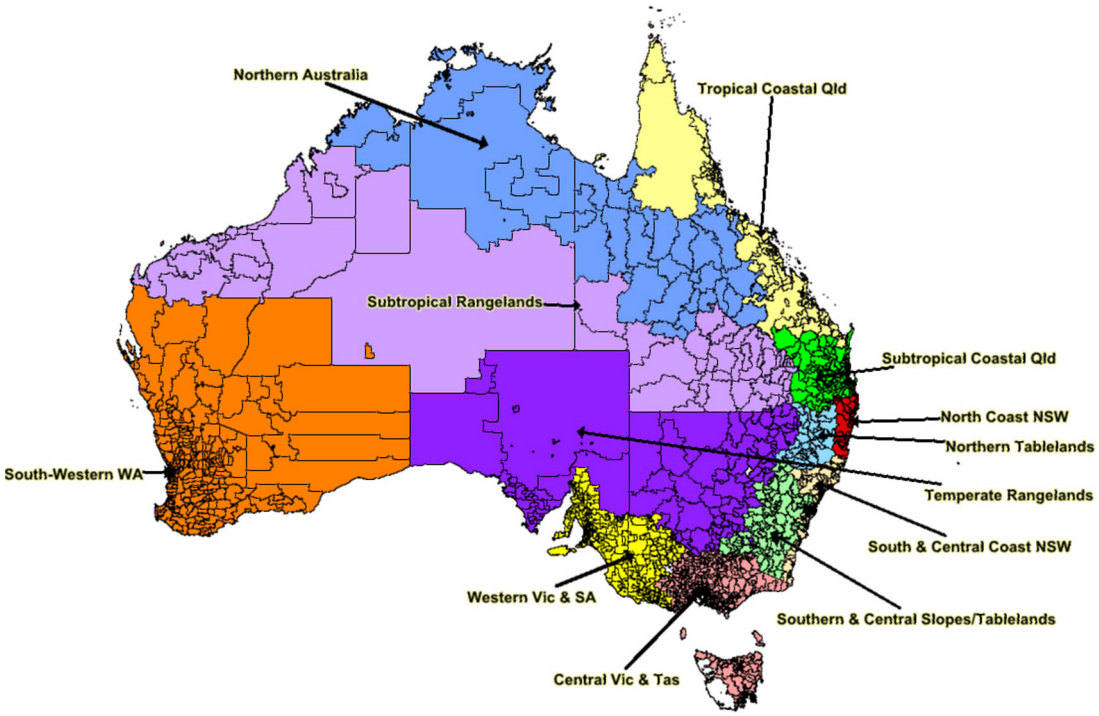

Fig. 1. Bioclimatic regions for cattle parasite distribution based on aggregated postcode regions. Postcode boundaries are marked with the size of the postcode region generally being inversely related to the intensity of agriculture within the region.

cattle and other species of livestock have burdens of internal parasites. This information may then be used for diagnostic purposes, to determine if drenching with an anthelmintic is warranted, to monitor the success of drench treatments and to determine if anthelmintic resistance is present (Roeber et al., 2013). During the period from 2002 to 2012, samples of faeces were collected from cattle around Australia and WEC testing was undertaken. The purpose of this testing was to demonstrate whether or not sufficient worm burdens were present to justify treatment with an anthelmintic. Where sufficient worm eggs were present in any submission the larvae were cultured and identified.

The objective of this paper is to describe the findings from this testing programme. In particular, variation in WEC and worm genus mix has been examined by age and weight of cattle, season and geographic region.

2. Materials and methods

For this analysis, submissions were restricted to sampling kits submitted to a parasitology laboratory run by Veterinary Health Research Pty Ltd., Trevenna Rd, West Armidale, NSW, 2350 (VHR). Results for samples submitted between 2002 and 2004 to the New South Wales Department of Agriculture laboratory at Menangle, NSW and the Elders worm testing laboratory at Armidale, NSW were excluded because individual WEC data were not archived for these submissions. Ten faecal samples were collected from groups of cattle and submitted to the laboratory via pre-prepared sampling kits. Individual WECs and bulked larval cultures were conducted using standard procedures (Hutchinson, 2008). No attempt was made to speciate the worms identified with identification to the genus level only. Date of sampling, property address, age, estimated average weight and production type of cattle sampled as well as last drench used were recorded. Data on pasture length and percentage of green pasture available was also collected, but this was not reliably reported and was excluded from the analysis.

Data from the laboratory submission form and the results of the WEC testing were entered into an Excel spreadsheet (Microsoft, Redmond, WA, USA) by VHR staff. These archived data were retrieved for all submissions between 2002 and the end of the 2012 calendar year.

These data were checked to identify outliers and ensure data integrity. For the purposes of geographic analysis, these data were grouped into postcode regions based on official Australia Post boundaries (www.auspost.com.au) and then into bioclimatic regions, based on the regions described in the Cattle Parasite Atlas (Anon, 2005). These regions are shown in Fig. 1 and generally share the same total annual rainfall and pattern of rainfall (summer or winter dominant). Mapping was conducted using MapInfo Professional (Pitney Bowes Software, Stamford, CT, USA) 2012 version 11.5.1. Postcode data was supplied via a Pitney Bowes update dated March 2013. The number of submissions by postcode was then determined and mapped graphically by postcode region using Tableau Desktop 7.0 (Tableau Software, Seattle, WA, USA).

The number of submissions for each year was determined. Frequency distributions of submissions by average weight range and age in years for sampled cattle were determined. Cattle older than 4 years or greater than 400 kg