World association for the advancement in veterinary parasitology conference 2013: A review

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Introduction
The 24th international conference of the World Association for the Advancement in Veterinary Parasitology (WAAVP) was held in 2013 in Perth, Australia. This paper is a brief review of four topics that were covered during this prestigious event.

Topic 1: Achieving veterinary guided parasite control for sustainable sheep production
R Churchill, Crookwell Veterinary Hospital

Parasitism by gastrointestinal nematodes and anthelmintic resistance present an increasing threat to the profitability of the Australian sheep industry. However there is declining use of rural veterinary practitioners by livestock producers, with the majority of parasitological advice provided to farmers from non-veterinary sources such as rural produce stores retailing anthelmintic products.

They examined the effectiveness of a parasitological monitoring and anthelmintic retailing service provided by a rural veterinary practice in south-eastern Australia from 2003 to 2012. This practice was providing faecal egg count reduction testing as well as free 14 day drench checks if farmers bought product from them.

Results and findings
There was a decreasing effectiveness of the macrocylic lactone group ($P=0.008$), increased use of 4-way combination anthelmintic treatments ($P<0.001$) and declines in other treatments ($P<0.05$).

There was an increased proportion of properties performing post-treatment faecal egg counts over the study period ($P=0.001$). (10%-35% over 9 years).

The study concluded that veterinary guided gastrointestinal parasite management in sheep has mutual benefits for sheep producers and rural veterinary practices, including:

- Appropriate advice on parasitological management.
- Observations on trends in regional anthelmintic usage.
- Early indication of anthelmintic resistance.
Topic 2: Lower worm egg counts associated with higher ewe body condition score

L Kahn, M Dever, S Bowers, University of New England

Managing breeding ewes to ensure they meet or exceed minimum body condition score (CS) targets (typically >3) is a critical issue for improving reproductive success. Higher CS is associated with more body protein and fat and this may be of benefit to host resistance against gastrointestinal nematode parasites (GIN). CS was estimated and faeces collected to determine worm egg counts (WEC) from 120 Border Leicester x Merino ewes on each of three farms on three occasions (prelambing, 8 and 14 weeks post lambing) in 2012-13. Ewe CS (1-5 scale) was categorised into 0.5 unit bands, from a low of 2-2.5 to a high of 4-4.5. Mean WEC was negatively associated with CS and back transformed values, separated (p<0.01) using a nonparametric multiple comparison test (Wilcoxon method), for the various CS bands were: 2-2.5=1520a epg; 2.5-3=1771a epg; 3-3.5=830b epg; 3.5-4=358c epg; and 4-4.5=262c epg.

The predominant GIN were *Haemonchus contortus* (53%) and *Trichostrongylus colubriformis* (42%). These results indicate that managing ewes to achieve CS targets for reproductive success will attract further benefit for host resistance to GIN. Higher CS (>CS=3) was associated with further reductions in mean WEC but the additional benefit may be offset when considered in conjunction with other issues such as whole-farm stocking rates.

When the results were analysed for the three separate recording times there was a strong negative association found at prelamb and at lamb marking, but at weaning the association had gone.
Figure 2. Body condition score and worm egg count prelamb.

Figure 3. Body condition score and worm egg count at lamb marking.

Not only was static body condition score important but a very strong association.

\((R^2 = 0.92; \ P < 0.001)\) was found between loss of body condition score in early lactation and worm egg output.

Figure 4. Change in body condition score of ewes from prelamb to lamb marking.
Conclusions

Body condition score of ewes was predictive of worm egg count during lactation.
- Higher BCS was associated with lower WEC.
- 1 BCS unit associated with 500-700epg lower WEC.
- Association weakens after lamb marking.

Change in body condition score after lambing was also strongly associated with worm egg count.
- Regardless of BCS.

Prelambling ewes with higher BCS was likely to have lower worm egg counts during lactation.

Topic 3: Assessing risk: Spatial trends and environmental risk factors for an emerging liver fluke of sympatric host species in Alberta, Canada by Melissa Beck, University of Lethbridge

This was an epidemiological study using Global Imaging Satellites (GIS) to produce a risk assessment map to pinpoint hotspots for a particular parasites transmission to its host. The parasite in question was *Dicrocoelium dendriticum* (an invasive trematode found in south-western Canada.) The study was conducted in Cypress Hills Interprovincial Park. This liver fluke had not been present in this area before 1990 but was now present in 40-80% of the Elk, deer and cattle. 100 randomly selected sites were used to collect data on the spatial modelling associations between the presence and density of infected ants (*Formica* spp., second intermediate host) and other common site features.

The results indicate that the presence of pure or mixed stands of aspen (*Populus tremuloides*) was most important in predicting further “hotspots” for ant-to-ungulate transmission, with infected intermediates not present under other canopy types. These aspen dominated hotspots of transmission were typically associated with moderately graded, south facing slopes and all sites were associated with intermediate levels of incident solar radiation.

The outcome of the study was the production of a fine scale predictive GSI Map for the Park and surrounding areas that will allow the quantification and visualisations of transmission risk areas for this parasite to its domestic and wild hosts.

Topic 4: Haemonchus vaccine: Barbervax

“Barbervax”, a vaccine for *Haemonchus contortus*, have been submitted to the regulators in Australia and South Africa and the product is expected to reach the market within two years.

The vaccine is unusual, partly because its antigens are parasite gut membrane proteins and therefore “hidden”, but also because the antigens are native proteins purified from adult worms. The gut membrane proteins of *Haemonchus* appear to be conserved since the vaccine is effective against all isolates of *H. contortus* tested internationally to date, including against *H. placei*, a different species. It is considered highly unlikely that worms resistant to the vaccine will develop and so the vaccine should offer a more sustainable approach to *Haemonchus* control than anthelmintic drugs.

Vaccination course
Two injections required at 3-6 weeks (most work done at three weeks), subsequent vaccinations needed at six week intervals.

Why do we need to keep boosting every six weeks?
Ag is hidden from host body so no natural exposure to keep boosting immunity.
Efficacy

Vaccination produces an 80-90% reduction in egg counts.

In the face of an existing infection, vaccination can partly treat but it does leave 30-40% of the adult worms. Shelf life is 32 months.

During 2011-2012 four very similar trials were performed on different farms. Each contained 40 vaccinated and 40 control lambs which grazed together to ensure equal exposure. Each farmer used his own anthelmintic regime for worm control in the ewes. The vaccinated lambs were first immunised when about six weeks old. Two more vaccinations followed at 3 or 4 week intervals, thereafter two more were given six weeks apart. Faeces and blood were sampled every fortnight for egg counts, haemoglobin concentration and antibody titres. Any lamb with an egg count greater than 15,000 per gram or a haemoglobin concentration less than 8.5g/100ml (equivalent to PCV of 25%) was given a short acting precautionary drench. Over the course of each trial the Haemonchus egg counts of the vaccinates were reduced on average by 80% compared to the controls and anaemia was also significantly reduced.

This vaccine is designed to take the place of long acting drenches, but treatment is still required for other parasite species.