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Smelling Parasites: Using odour to diagnose nematode infection

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Nematode parasites of livestock are an important cause of economic and production losses in Australia. Current control of these parasites relies anthelmintic drugs. The effectiveness of these drugs is limited, with resistance to all major anthelmintic chemical groups being reported (Bird et al. 2001). Current diagnosis relies on faecal egg count, which is slow, expensive and inaccurate. This project aims to investigate the potential of faecal odour analysis as a possible diagnostic tool. Such a tool may allow all animals in a flock to be assessed individually prior to treatment.

It is suggested by de Kok et al. (1992) that gas chromatography/mass spectrometry (GC/MS) provides an ideal combination for the characterization and identification of volatile compounds. In order to provide results in vitro that are comparable to field conditions it is essential that sample preparation methods are simple, avoiding the use of organic solvents. Developed during the last decade, Solid-Phase Microextraction (SPME) is an method that integrates sampling, extraction, concentration and sample introduction into a single, solvent-free step (Mills and Walker 2000). This investigation makes use of the ability to combine SPME as a one step extraction process, with GC/MS, to provide a profile of sheep faecal odour composition in healthy sheep and draw comparisons with the odour composition of sheep infected with *Ostertagia circumcincta*.

Sample preparation for this study involves collection of faeces from six, five-month old wethers. The faeces is crushed and placed in 4 ml septum vials and kept at 4ºC for 1 hour before being heated to 37ºC. Headspace volatiles are extracted using a 75 µm Carboxen SPME fibre and directly transferred into the GC injector where they are thermally desorbed, separated and quantified. Current results suggest the headspace of control faeces is dominated by alcohols, organic acids (e.g. acetic and propanoic acid) and phenol groups. All six sheep provide comparable control profiles at this stage of the investigation. These profiles will be later compared to infected samples from each sheep at chronologic stages of infection. Odour composition is expected to vary with levels and type of infection, this too will be investigated

Once infection profiles have been determined, further work may involve the incorporation of dogs (German Shepherds), currently being trained for the detection of nematode infections in sheep at La Trobe University. This work may also complement current studies in Armidale using electronic nose (E-nose) technology. Once a molecular profile has been determined for an infection there is potential to design a device specific for detection of internal parasites and conduct trials based on this knowledge.

Bird, J., Shulaw, W. P., Pope, W. F. and Bremer, C. A., 2001. Control of anthelmintic resistant endoparasites in a commercial sheep flock through parasite community replacement. Veterinary Parasitology. 97, 219-225.

de Kok, T. M. C. M., Levels, P.J., van Faassen, A., Hazen, M., ten Hoor, F. and Kleinjans, J. C. S., 1992. Chromatographic methods for the determination of toxicants in faeces. Journal of Chromatography B. 580, 135-159.

Mills, G. A. and Walker, V., 2000. Headspace solid-phase microextraction procuedures for gas chromatographic analysis of biological fluids and materials. Journal of Chromatography A. 902, 267-287.