

McMEEKAN MEMORIAL AWARD

David M. Leathwick

Dave Leathwick began his research career at the “grass roots” as a technician in the Weed Biology and Control team of the Ministry of Agriculture between 1974 and 1979. He then completed a B.Sc. degree, with honours in zoology, at the University of Canterbury followed by a Ph.D. in entomology at Lincoln College. His thesis title was “Applied ecology of the Tasmanian lacewing *Micromus tasmaniae* Walker”. Dave’s research then headed in new directions and from 1988 until today, his primary focus has been sustainable control of nematode parasites of sheep and preventing or delaying the onset of drench resistance.

Outputs from Dave Leathwick’s team have had a major influence on parasite management and drenching practices in New Zealand. The widespread adoption of combination drenches whereby two or more actives are formulated together in a drench to impart special activity profiles is one example. Unlike in some countries, combinations have been widely adopted in New Zealand and their use has helped to slow the further development of drench resistance. Dave has been a consistent advocate for their value and has proposed specific combinations of actives now on the market.

The use of refugia to slow the development of drench resistance is a second example. This practice requires farmers to leave a proportion of their animals un-drenched in order to retain a population of unselected worms still susceptible to drench actives. The advice to not drench a proportion of animals in a flock ran counter to traditional time-honoured advice to make sure that all animals were in fact drenched and was viewed with scepticism by some. Dave provided modelling data to support the prediction that maintaining susceptible worms in “refugia” would slow the development of drench resistance and was the first to demonstrate this experimentally in rigorous field trials. The concept of maintaining worms in refugia is now an accepted component of sustainable parasite management.

Thirdly, Dave’s modelling and field research identified and then confirmed high-risk management practices which augment the development of drench resistance. Similar to refugia, some of these required farmers to adopt practices which ran counter to time-honoured traditions. For example, moving drenched sheep to fresh, ungrazed pasture immediately after drenching carries a high risk of



selecting and expanding the population of worms which are resistant to anthelmintics because the pasture becomes selectively contaminated with eggs from the minority of worms which have survived treatment. The advice now going to farmers who wish to drench their lambs onto “clean” pasture is to either leave a small percentage untreated as a source of refugia or to follow behind them with undrenched adult ewes to contaminate the pasture

with susceptible worms.

Dave Leathwick has put a lot of effort into communicating his research findings over the past five years. He has been frequently invited to speak at farmer meetings, industry forums, veterinary symposia and other scientific conferences, both nationally and abroad. His findings have been translated into easily implemented management practices, which have been widely disseminated in the sheep industry and have become best-practice for worm control. Since 2005, he and his team have published 22 papers in peer-reviewed scientific journals. In 2006 and again in 2008, one of his papers was judged by the Australian College of Veterinary Scientists to be the most commendable paper published that year in the New Zealand Veterinary Journal.

Farmer surveys repeatedly identify gastrointestinal nematodes as the single most significant disease limiting productivity of the sheep industry. Economic analyses have revealed several sobering indicators of the huge costs imposed on farmers by nematodes. The direct cost of internal parasites to the sheep, beef and deer industries was estimated to be \$700m per annum and a massive 33% of the productivity which was achieved was “drench-dependent” in the sense that it would not be realised if drenches became ineffective. At the same time it was calculated that the net present value of research into better parasite management practices equated to about \$5.5 billion. It is impossible to say exactly how much of this potential financial value has actually been realised in the succeeding five years. What is certain however, is that very significant productivity gains have been achieved and the livestock industries in New Zealand are better positioned now than they would have been had Dave Leathwick stuck solely to weeds and insects in his research career.

Wayne Hein and Warren McNabb