Impact of feeding bioactive plants on parasite infection and performance in sheep: a meta-analysis

Adam D. Hayward[1] and Miguel Peña-Espinoza[2]

1. Moredun Research Institute, Penicuik, UK
2. University of Veterinary Medicine, Vienna, Austria

Gastrointestinal nematodes (GIN) are prevalent and damaging parasites of ruminant livestock worldwide. The spread of anthelmintic resistance means that alternative control measures are needed; one such measure is bioactive plants that contain compounds that have anthelmintic properties in vitro. Studies feeding bioactive plants to animals infected with GIN have shown that treated animals have reduced GIN infection levels and enhanced weight gain. On the other hand, many similar studies using the same plant species show limited effects. This variation in outcomes may be underpinned by variation in study design such as the bioactive species, the part of the plant used, the way the plant is processed and the dose and duration of feeding, plus characteristics of the animals and parasite infection. To assess the impact of feeding bioactive plants on parasite infection and performance in sheep, and the impact of experimental design on the outcome of feeding trials, we conducted a meta-analysis of data from 140 published papers. Our meta-analysis compared markers of parasite infection (FEC, worm burden, immune parameters) and performance (weight, growth, milk, wool) in animals fed with bioactive plants versus control animals. Overall, animals fed bioactive plants had lower levels of parasite infection than control animals. Heterogeneity between effect sizes was high, but plant species only accounted for 3% of variation in outcomes. Bioactive plants had increasingly beneficial effects the longer they were fed to animals, and they had more beneficial effects on FEC and worm burden than they did on immune parameters. Animals fed bioactive plants had higher performance, although this was not significant once publication bias was accounted for. Bioactives had larger effects on performance the longer they were fed for, and we also found that bioactives had a particularly beneficial effect on milk production. Our results show that feeding bioactive plants to sheep has beneficial effects on parasite burden without strongly affecting performance. Additionally, bioactive plants are especially beneficial when fed for longer, but the species used has little effect on study outcome once beneficial effects have been demonstrated in vitro.