

From the lab to the farm: using a multi-actor approach to foster sustainable parasite controlS. Athanasiadou¹, C. Chylinski¹, A. Allamand² and V. Maurer³¹SRUC, Roslin Institute Building, EH25 9RG, Easter Bush, United Kingdom, ²Soil Association, 20 Potterow, EH8 9BL, United Kingdom, ³FiBL, Ackerstrasse 113, 5070 Frick, Switzerland; spiridoula.athanasiadou@sruc.ac.uk

While anthelmintics can be effective to control parasitic disease, due to their synthetic nature they are contentious inputs for organic systems. Development of alternatives is a prerequisite to reduce the environmental footprint of organic agriculture, whilst maintaining livestock health and welfare. To develop implementable and bespoke alternatives for parasite control, in RELACS we have followed a multi-actor approach which entails engagement with multiple stakeholders, throughout the project. At the first stage, information on current management strategies, farmers perceptions and potential use of alternatives was collected. Expert opinion (advisors and scientists), farmer interviews and surveys, and data analysis from previous projects, were the sources of information. This enabled us to identify two alternatives: heather, as a model bioactive plant, and nematophagous fungi, as a model biological control method. Farmers associations were interviewed to report on the grazing patterns of upland sheep and potential access to heather in different countries; they then orchestrated heather sample collection, which were sent to researchers for *in vitro* analysis. The optimisation of fungi's anthelmintic efficacy was achieved through a series of *in vitro* testing. Animal experimentation followed on, at the research facilities of RELACS partners. This step was vital to identify undesirable/complementary effects of heather and fungi supplementation on the health, productivity and welfare of the animals, prior to their roll out on farm. At the final stages of the project, scientists, farmers and farmer associations interacted in focus groups, to discuss the scientific evidence generated and to debate management practices and cost-benefit analysis of the alternatives. Some farmers carried out on-farm validations, to corroborate the experimental outcomes and identify constraints during the practical implementation of lab-developed tools. This multi-actor approach is expected to maximise impact and facilitate implementation of the alternatives for sustainable parasite control.

Anthelmintic efficacy of heather extracts against ovine gastro-intestinal nematodesF. Shepherd^{1,2}, C. Chylinski², M. Hutchings², R. Kelly¹, A. MacRae¹, J.-P. Salminen³, V. Maurer⁴, H. Steinshamm⁵, S. Fittje⁶, A. Morell Perez⁷ and S. Athanasiadou²¹R(D)SVS, Edinburgh, EH25 9RG, United Kingdom, ²SRUC, Edinburgh, EH25 9RG, United Kingdom, ³University of Turku, Turku, 20014, Finland, ⁴FiBL, Frick, 5070, Switzerland, ⁵NIBIO, Tingvoll, 6630, Norway, ⁶Naturland, Gräfelting, 82166, Germany, ⁷ECOVALIA, Sevilla, 41013, Spain; francesca.shepherd@sruc.ac.uk

The use of anthelmintics in organic farming is regulated; however its limited use is permitted due to GI nematodes threatening the health and welfare of animals worldwide. There is a requirement for a reduction of contentious inputs in organic farming, such as anthelmintics, and the H2020 project RELACS focuses on developing alternatives for sustainable parasite control. One of such alternatives is the use of bioactive plants; this study focuses on the perennial shrub heather (*Ericaceae* family) as it is a plant rich in condensed tannins, which have been shown to have anthelmintic properties, and the plant is highly abundant across Europe. The objective was to compare the anthelmintic efficacy of heather acetone extracts from five European countries, across two seasons, against two of the most common GIN species in small ruminants: *Teladorsagia circumcincta* and *Trichostrongylus colubriformis*. A total of 11 heather samples were analysed to determine their polyphenol content, including type and amount of CTs, and tested *in vitro* with the aim of quantifying their impact on egg hatching and larval motility. Results showed the heather extracts reduced egg hatching in a dose dependent manner ($P < 0.001$) and reduced larval motility at the highest concentration of 200µg/ml ($P < 0.05$). The anthelmintic efficacy of the heather varied by season, country of origin and the species of heather tested on both egg hatching and larval motility, with variation also seen on the susceptibility of the two GIN species egg hatching rate. These variations in extract activity were not always consistent between the two *in vitro* tests indicating that the active compounds may target different parasite life stages. Results demonstrate heather does show anthelmintic ability when tested *in vitro*, so has promise as a sustainable parasite control method and should be investigated further.