

2nd COMBAR TRAINING SCHOOL

Advances in the field diagnosis of helminth infections and anthelmintic resistance in ruminants

CREMOPAR (Eboli, Salerno), 12-14 June 2019

In brief

The COST Action COMBAR aims at coordinating research to combat anthelmintic resistance (AR) in ruminants.

There is a great need to establish field-applicable and improved resistance-detection tools. In an era of technological revolutions in the diagnostic industries, also diagnostic methods for parasitic helminth infections are evolving, for instance through the use of FLOTAC technology, the use of pooled samples, point-of-care diagnosis and eventually full automation of traditional faecal egg counting (FEC) methods. Although definitive molecular tests remain elusive for most anthelmintic drug groups and helminth species, we will also review the current state-of-the art regarding *in vitro* and molecular diagnosis of AR.

Thanks to this 3-day training school, participants will have the opportunity to train and deepen the principles of various diagnostic methods.

This training school is organized as part of the activities of the COMBAR Working Group “Improving diagnosis”. At the end of the training school, participants will have the basis to correctly perform and/or interpret FEC methods, faecal egg count reduction tests, *in vitro* assays such as the egg hatch or larval migration inhibition test and DNA-based methods for the diagnosis of helminth infections but particularly the assessment of anthelmintic efficacy in ruminants. The training school will contribute to the harmonisation and validation of diagnostic methods and the use of composite samples across laboratories with the aim to provide up-to-date and reliable information on the occurrence of AR in Europe.

Lectures will be provided by experts with backgrounds in parasitology, biotechnology and epidemiology. Economists will cover the topic of market analysis and developing business plans for novel commercial tests.



Programme

Day 1 – Diagnosis of helminth infections

8h30 – 9h00 Registration

9h00 – 9h15: Welcome introduction to COMBAR and Training School (Giuseppe Cringoli and Laura Rinaldi)

9h15 – 9h30: Who is who and expectations of the workshop

9h30 – 10h00: Faecal Egg Count/Faecal Egg Count Reduction Test (FEC/FECRT): what's new? (Laura Rinaldi)

10h00 – 10h30: Mini-FLOTAC vs other FEC techniques for the detection of gastrointestinal nematodes and *Fasciola hepatica* (Maria Paola Maurelli)

10h30 – 11h00 Coffee Break

11h00 – 12h00: Pyrosequencing based analysis of benzimidazole resistance-associated beta-tubulin single-nucleotide-polymorphism frequencies in samples of pooled trichostrongyle larvae (Georg von Samson-Himmelstjerna)

12h00 – 12h15: Introduction to WG1 Task 1.3 (Laura Rinaldi)

12h15 – 13h15: Mini-FLOTAC Market Analysis (Oliva Maria Dourado Martins and Blagika Sekovska)

13h15 – 14h15 Lunch

Practice in lab (Maria Paola Maurelli and Antonio Bosco)

14h15 – 14h45: Hands-on Mini-FLOTAC: overview equipment and processing the samples

14h45 – 15h15: Standard operating procedures for the use of Mini-FLOTAC and Fill-FLOTAC

15h15 – 15h45: Standard operating procedures for pooled FEC/FECRT in sheep and cattle

15h45 – 16h15: Coprocultures

19h00: Dinner

Day 2 – On farm detection of AR and good anthelmintic treatment practices

9h00 – 9h30: Survey design for detecting AR (Laura Rinaldi)

9h30 – 10h00: Standard operating procedures for collecting and preserving faecal samples (Antonio Bosco)

10h00 – 11h00: How to improve the standardization, interpretation and the diagnostic performance of the faecal egg count reduction test (Bruno Levecke)



11h00 – 11h30 Coffee break

11h30 – 13h30: Mini-Flotac *on-farm* for the detection of AR (Antonio Bosco and Marta De Alcubierre)

13h30 – 14h30: Lunch on farm

14h30 – 16h30: Best practice of anthelmintic treatment (Antonio Bosco and Marta De Alcubierre)

17h30 Group visit to Paestum Temples and Dinner

Day 3 – *In vitro* tests for AR

8h30 – 9h00: Update on *in-vitro* techniques to detect AR (Marián Várady)

9h00 – 11h00: Hands-on Egg Hatch Test (Marián Várady, practice in lab)

11h00 – 11h30: Coffee Break

11h30 – 12h30: Protocols for standardized COMBAR FECRT (Laura Rinaldi)

12h30-14h00: Lunch

14h00-15h00: Overall discussion

15h00-15h15: Conclusion (Giuseppe Cringoli and Laura Rinaldi)

Experts

Prof. dr. Giuseppe Cringoli - Giuseppe Cringoli, graduated in Veterinary Medicine, is Full Professor of Parasitology and Parasitic Diseases at the Department of Veterinary Medicine and Animal Production, University of Naples Federico II. Since 2001 he is the Director of the Regional Center for Monitoring of Parasitic Diseases (CREMOPAR, Campania Region) and since 2006 he is Diplomate of the European Veterinary Parasitology College. Since 2012 he is Coordinator of the PhD course of “Veterinary Sciences”. Main research interests are epidemiology, diagnosis and control of protozoa, helminthes and artropoda of veterinary interest. He is the inventor of the FLOTAC, Mini-FLOTAC and Fill-FLOTAC, new diagnostic methods for copromicroscopic diagnosis of parasites in animals and humans. Giuseppe Cringoli is honorary member of the International Scientific Society GnosisGIS and co-founder (as well as member of the editorial board) of the international scientific journal Geospatial Health. He was scientific coordinator and responsible of Research Unit of research projects of national and international importance. He has been invited lecturer/keynote speaker/convenor/chairperson at symposia/scientific sessions of national and international Congresses. The scientific production in veterinary parasitology consists of over 190 publications, published on international scientific journals with peer referee.

Prof. dr. Bruno Levecke - Bruno Levecke is an Assistant Professor (Virology, Parasitology & Immunology) in the Parasitology Laboratory, Faculty of Veterinary Medicine at Ghent University, and Director of the World Health Organization Collaborating Centre for the monitoring of anthelmintic drug efficacy for soil-transmitted helminthiasis. Although his publications cover a wide spectrum of human and zoonotic parasitoses, his primary research interest is the diagnosis, epidemiology and control of human helminthiasis, including soil-transmitted helminths. After receiving his first degree in Veterinary Medicine in 2005, Bruno completed a PhD in 2010 on the importance of gastro-intestinal protozoa in captive non-human primates. Since then, he has gone on to author over 75 papers, and his work has contributed to the development of new World Health Organization guidelines for the assessment of drug efficacy against both STH and schistosomiasis. He is the principal investigator for the Starworms Project, a Bill & Melinda Gates Foundation funded initiative that aims to strengthen the monitoring and surveillance of drug efficacy and anthelmintic resistance in programs aimed at eliminating and controlling soil-transmitted helminths infections in humans. Specific objectives of this project include (i) to validate diagnostic tools for monitoring drug efficacy and the spread of anthelmintic resistance; (ii) to establish a surveillance system that monitors the global patterns of drug efficacy and spread of anthelmintic resistance in soil-transmitted helminths programs, and (iii) to develop supporting tools to plan, analyze and follow-up on surveys on drug efficacy and the spread of anthelmintic resistance.

Prof. dr. Oliva Martins - Oliva Maria Dourado Martins is a researcher and professor at the Institute Polytechnic of Tomar (IPT), in Portugal. As a professor, marketing and communication are the main teaching areas. As a researcher, she works in two different projects: COMBAR COST-EU and GEDITEC. COMBAR is a research on the prevention of anthelmintic resistance in helminth parasites of ruminants in Europe, and GEDITEC is a project at the IPT Research Center (Centro de Investigação Aplicada em Economia e Gestão do Território - CIAEGT-IPT). GEDITEC is a research on the competitiveness of the territories. Marketing is a correlate area of both projects. As a researcher, the results of the developed work are defined mainly by articles, chapters of a book and presentations in conferences. Furthermore, the developed work also results in two distinctions: one scientific award of thesis and another as an excellence work reviewer.

Prof. dr. Laura Rinaldi - Laura Rinaldi got a master degree in Biological Sciences in 1997 and a specialization in Applied Biotechnology in 2001 at the University of Naples Federico II, Naples. In 2014 she obtained a PhD in Veterinary Science at University of Ghent (Belgium). Since 2015 she is Associate Professor at the Department of Veterinary Medicine and Animal Production, University of Naples Federico II. She became Associate Member of the European Veterinary Parasitology College in 2006 and received the International "Peter Nansen Young Scientist" Award given by the World Association for the Advancement of Veterinary Parasitology (WAAVP) in 2011. She has been responsible of Research Units of Italian and European research projects dealing with diagnosis, epidemiology and control of parasitic infections in ruminants. She is the ERASMUS coordinator at the Department of Veterinary Medicine and Animal Production, University of Naples Federico II. Laura Rinaldi is the President of the International Society for Geospatial Health (GnosisGIS) and of the Livestock Helminth Research Alliance (LiHRA). She is one of the co-founders and Associate Editor of the Journal Geospatial Health and Section Editor of the Journal BMC Veterinary Research. She has been lecturer/keynote speaker/chairperson at national and international congresses around the world, particularly on the subjects of diagnosis, epidemiology and controlling parasites of livestock. The scientific production in veterinary parasitology consists of over 190 publications, published on international scientific journals with peer referee.

Prof. dr. Blagica Sekovska - Blagica Sekovska has a Bachelor in Agriculture and food Engineering, a Master (2001) and PhD (2006) in Agricultural Economics and Marketing Management from the University "St. Cyril and Methodius" Skopje. Until 1994 she worked at Faculty of Veterinary Medicine and since 2006 she is assistant professor at the Department of Rural Economy and Management of the University "St. Cyril and Methodius", Skopje. Here, she teaches rural economy, management of veterinary practice, marketing of veterinary practice and coordinates national and international research projects on the economic, institutional and social aspects of farming and food systems, and also economical and management aspects of veterinary profession. She focuses on marketing and management aspects of our farming and food systems, especially on economic aspects of livestock breeding, ecological farming systems and especially dairy production. Her attention is currently focused on sustainable development and green economy. Specific topics of her research deal with economic and social aspects of vector borne diseases and socio-economic aspects of one health approach.

Prof. dr. Marián Várady - Marián Várady studied veterinary medicine at the University of Veterinary Medicine in Košice, Slovakia, where in 1989 he obtained his doctoral degree. He obtained PhD at the Institute for Parasitology of Slovak Academy of Sciences in Košice at 1995. Since 2013 he is Associate Professor and Head of Department of Experimental Pharmacology at Institute of Parasitology of Slovak Academy of Sciences in Košice. His main research interests are diagnosis of parasites using quantitative coprological methods and application and standardization of *in vivo* and *in vitro* tests for the detection and characterization of anthelmintic resistance in livestock. He has been lecturer/keynote speaker/chairperson at national and international congresses around the world, particularly on the subjects of diagnosis, epidemiology and controlling parasites of livestock. Marián Várady is author or co-author of more than 90 scientific publications in peer reviewed journals and has been responsible for many national and international research projects including EU funded programs.

Prof. dr. Georg von Samson-Himmelstjerna - Georg von Samson-Himmelstjerna studied veterinary medicine at the University of Veterinary Medicine in Hannover, Germany, where in 1995 he also obtained his doctoral degree at the Institute for Parasitology. Following a brief Postdoc time he moved to Bayer Animal Health where he was head of the helminthology laboratory in the drug discovery. After four year in industry he took the opportunity to return to academia at his alma mater where he then worked for five years as group lead in the Institute for Parasitology before he became Professor for Molecular Parasitology. In 2009 he accepted the offer to become Professor for Parasitology at the Freie Universität Berlin, Germany where since then he is director of the Institute for Parasitology and Tropical Veterinary Medicine. His many research activities focus on the mode of action and mechanism of resistance of antiparasiticides, namely anthelmintics. He has been lecturer/keynote speaker/chairperson at national and international congresses around the world, particularly on the subjects of diagnosis, epidemiology and controlling parasites of livestock. He has published more than 190 scientific publications in peer reviewed journals and been responsible for numerous research projects including several in EU funded programs.

Assistants

Dr. Antonio Bosco - Antonio Bosco, DVM, PhD in biology, pathology and environmental hygiene in Veterinary Medicine, is currently a Post-Doc at the Unit of Parasitology and Parasitic Diseases, Department of Veterinary Medicine and Animal Production at the University of Naples Federico II, Italy. He works as a veterinarian at the Regional Centre of Monitoring Parasitic Infections of Livestock (CREMOPAR). He has been investigator of several field trials on the efficacy of anthelmintics in ruminants and participated at several regional, national and European projects focused on livestock parasites. He is a member of the Livestock Helminth Research Alliance (LiHRA). His scientific research experience mainly focuses on epidemiology, diagnosis and control of helminth infections in livestock. The scientific production consists of 90 publications: papers published on national and international scientific journal and proceeding of national and international conferences.

Dr. Marta De Alcubierre - Marta De Alcubierre, graduated in Veterinary Medicine in 2018, is currently working with a research scholarship at the section of Parasitology and Parasitic Diseases at the Department of Veterinary Medicine and Animal Production at the University of Naples Federico II, Italy. She works as a veterinarian at the Regional Centre of Monitoring Parasitic Infections of Livestock (CREMOPAR). She has contributed to several field trials on the efficacy of anthelmintics in ruminants and to the studies for the development of new diagnostic methods in parasitology (FLOTAC, Mini-FLOTAC and Fill-FLOTAC). Her scientific research experience mainly focuses on epidemiology, diagnosis and control of helminth infections in livestock, working especially in coprology for the detection of anthelmintic efficacy and resistance.

Dr. Maria Paola Maurelli - Maria Paola Maurelli graduated in Veterinary Biotechnology, obtained a PhD in Biology, Pathology and Environmental Hygiene in Veterinary Medicine at the University of Naples Federico II, Italy. From 2008 to 2016 she worked as Post-Doc at the Unit of Veterinary Parasitology and Parasitic Diseases and since November 2016 is Researcher in Veterinary Parasitology and Parasitic Diseases at the Department of Veterinary Medicine and Animal Production, University of Naples Federico II. Her main research interests are epidemiology, diagnosis (with classical and innovative techniques) and control of protozoa, helminths and arthropods of animals. She has participated at the development and the validation of innovative (FLOTAC and Mini-FLOTAC) techniques for copromicroscopic diagnosis of helminths and protozoa in animals and humans; moreover she was member of organizing committee and trainer of several international courses on FLOTAC and Mini-FLOTAC techniques. She has participated at several regional, national and international scientific projects. She is also Associate Editor of BMC Veterinary Research and Journal of Veterinary Medicine and Animal Sciences. Her production consists of 110 publications, papers published on national and international scientific journals with impact factor and proceedings of national and international conferences.

Practical Information

Registration:

COMBAR participants can apply for a (partial) reimbursement of travel and accommodation expenses by sending a short motivation letter (1 page max) and short CV (1 page max) to lrinaldi@unina.it **before the 15th April 2019**. Participants eligible for reimbursement will be notified shortly after. Priority will be given to early career investigators taking into account a gender and geographical balance.



Participants are requested to fill the registration form and bring an amount of € 150 (excl. VAT) cash to the meeting, which includes conference facilities, lunch and coffee breaks. Participants should therefore register for participation on the COST website.

Rates:

COMBAR participants¹: € 150.00 (excl. VAT)

External participants: € 450.00 (excl. VAT)

CREMOPAR

Strada Statale 18 - Località Cioffi - 84025 - Eboli (SA)

email: cremopar@unina.it



The Center is located in Borgo Cioffi, Eboli (Salerno province), southern Italy.

Hotel

Should be booked at the participants own expenses.

Hotel San Luca

195 € for 3 nights / double room for single use including breakfast in BB

240 € for 3 nights / double room including breakfast in BB

HB supplement: 20 € / person including drinks

¹ COMBAR participants are individuals who have signed up to the activities of at least one of the three working groups.



No city tax

BOOKING REFERENCE "CREMOPAR"

How to get there from the airport?

Participants are invited to **arrive at the Napoli International Airport (Capodichino)** on 11 June in the time slot from 13:00 to 19:00. A shuttle will take all the participants to the hotel.

Participants willing to arrive at another time must provide by themselves according to the following indications:

Take the bus "ALIBUS" from Naples International Airport of Capodichino to the central train station of Naples located in Piazza Garibaldi.

There are different Regional trains to Battipaglia. Take the Regional train directed to one of the following cities: Eboli, Sapri, Cosenza or Paola and after ca. 1 hour you will be at the train station of Battipaglia.

Get out the train station and take the bus (032, 034, 035 or 036) to the Hotel San Luca, Battipaglia (ca. 6 min).

Further questions and information:

- Practical arrangements and contents:

Prof. Laura Rinaldi

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- Further info on the action: www.combar-ca.eu

Organisation

This workshop is organised in the framework of the COST Action COMBAR and is the result of a collaboration between The Regional Centre of Monitoring Parasitic Infections in Livestock (CREMOPAR), the Department of Veterinary Medicine and Animal Production of the University of Naples Federico II, the Freie Universität Berlin and Kreavet.



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