

Report of training workshop on the diagnosis and control of gastro-intestinal parasites and coenurosis in small ruminants and dogs

Mesfin Mekonnen¹, Getachew Terefe², Bersissa Kumsa² and Theodore Knight – Jones¹

¹ International Livestock Research Institute

² Addis Ababa University, College of Agriculture and Veterinary Medicine



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CGIAR is a global partnership that unites organizations engaged in research for a food-secure future. The CGIAR Research Program on Livestock provides research-based solutions to help smallholder farmers, pastoralists and agro-pastoralists transition to sustainable, resilient livelihoods and to productive enterprises that will help feed future generations. It aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world. The Program brings together five core partners: the International Livestock Research Institute (ILRI) with a mandate on livestock; the International Center for Tropical Agriculture (CIAT), which works on forages; the International Center for Research in the Dry Areas (ICARDA), which works on small ruminants and dryland systems; the Swedish University of Agricultural Sciences (SLU) with expertise particularly in animal health and genetics and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) which connects research into development and innovation and scaling processes.


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Patron: Professor Peter C Doherty AC, FAA, FRS

Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996

Box 30709, Nairobi 00100 Kenya
Phone +254 20 422 3000
Fax +254 20 422 3001
Email ilri-kenya@cgiar.org

ilri.org
better lives through livestock

ILRI is a CGIAR research centre

Box 5689, Addis Ababa, Ethiopia
Phone +251 11 617 2000
Fax +251 11 667 6923
Email ilri-ethiopia@cgiar.org

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Executive summary

Gastrointestinal tract (GIT) parasite infections and coenurosis are a major health challenge affecting production and productivity of small ruminants in Ethiopia. The control of GIT parasites is a central part of small ruminant health management strategy. For controlling the GIT parasites and coenurosis, examination and diagnosis of infested animals is needed. The training by the International Livestock Research Institute (ILRI) and Addis Ababa University, College of Agriculture and Veterinary Medicine was delivered to national research partners from 26–30 July 2021 to increase their knowledge on diagnosis and control of GIT parasites and coenurosis. Eight researchers and laboratory assistants from partner agricultural research institutes were trained on the theory and laboratory practical parts of diagnosis and control of GIT parasites and coenurosis in small ruminants. At the end of the training, the researchers agreed to apply the training on the planned small ruminants' gastrointestinal parasites and coenurosis control programs which is one of the main plans of the SmaRT Pack project of CGIAR Research Program on Livestock.

Introduction

Gastrointestinal parasites pose a significant threat to animal production and productivity. They are a world-wide problem for both small- and large-scale farmers, but their impact is greater in sub-Saharan Africa in general and Ethiopia in particular due to a wide range of agro-ecological factors suitable for various hosts and parasite species.

Management of parasites, gastrointestinal worms in particular, is often a primary animal health issue for many livestock-keepers. Parasite control should form a central part of every small ruminant health management strategy in order to mitigate its effect on production and welfare. Given the seasonality of helminth infection in Ethiopia, strategic use of anthelmintics is required.

Coenurosis (gid or sturdy), a fatal disease of sheep caused by the larval stages of *Taenia multiceps*, causes a serious impact on small ruminant production. The clinical signs are variable and may be confused with other neurological conditions. The case fatality rate is 100% (Ahmed and Ali 1972). Njau et al. (1988) reported 5% annual mortality of sheep in the Ethiopian highlands due to coenurosis.

In controlling gastrointestinal parasite infections and coenurosis in specific value chain sites, ILRI has been working with national agricultural research institutes in Ethiopia. The national research institutes coordinate with ILRI to implement animal health prevention and control activities planned by the SmaRT Pack project, which works on the integrated interventions including the control of gastrointestinal parasites to transform small ruminants sector in community-based breeding program (CBBP) sites of Ethiopia. The partners research centres have conducted deworming campaigns with diagnosis of parasitic infections in Menz, Doyogena, Bonga and Abergelle CBBP sites in the support of CGIAR Research Program on Livestock (CRP Livestock). However, there was a gap in the knowledge of the researchers and laboratory assistants on diagnosis of GIT parasites and coenurosis.

For the diagnosis and control of GIT parasites and coenurosis, ILRI's long-time partner, the Addis Ababa University, College of Agriculture and Veterinary Medicine; collaborated in delivering training to researchers and laboratory assistants from the national research centres with the objective of developing the capacity of national researchers and laboratory assistants on the diagnosis and control of gastrointestinal parasites and coenurosis. Due to this training, the implementation and scaling up of gastrointestinal and coenurosis control programs will be improved, which will also increase the production and productivity of small ruminants.

Opening address

The opening speech was done by Hika Waktole, the dean of College of Agriculture and Veterinary Medicine, Addis Ababa University (AAU). He addressed the importance of the collaborative work of his college with different international organizations. He also noted that ILRI has been doing various activities in collaboration with AAU. Additionally, he mentioned that the trainees were lucky that the two experienced veterinary parasitology professors at the college delivered the training. Lastly, he welcomed all the training participants and wished them a happy time and stay at the beautiful city, Bishoftu, and College of Agriculture and Veterinary Medicine.

After the welcome and opening speech by the dean of the college, the general overview of the CRP Livestock-funded SmART Pack Ethiopia country project was presented by Mesfin Mekonnen, a research associate at ILRI. The integrated animal health activities planned for different community-based breeding program sites, the status of activities, gaps and challenges of interventions and data collection and future directions were also presented by the ILRI representative.

Introductions of the participants and training

After the opening speech and presentation about the project, all the training participants introduced themselves, the place of their work and their role. Then the leader of training, Professor Getachew Terefe, introduced the training sessions and the schedule for the five-day training. According to the plan, the training module had two parts: the first session was on theory on the helminth parasites of small ruminants and helminth parasites of dogs (emphasis on cestodes) for which forty per cent of the time was allocated while the second part was the practical demonstration session constituting sixty per cent of the time allocated for laboratory practice on sampling, processing and identification of parasites from live and dead animals.

Training objectives and approach

The intention of the training was to provide hands-on training on the diagnosis of helminth parasitism in small ruminants and dogs and recap some control methods for GIT parasites of small ruminants. The training was initiated to equip the trainees with the following knowledge and skills.

- Differentiation of the different genera of helminths of sheep and goats morphologically
- Description of the different genera of cestode parasites affecting dogs morphologically
- Collection, transportation and preservation of sheep and goats faecal samples
- Restraining of stray and owned dogs for sampling
- Collection, transportation and preservation of dog faecal samples
- Processing of faecal samples and microscopic examination
- Parasitological techniques to process faecal samples for microscopy
- Identification of different genera of helminths at different stages (egg, larvae and adult)
- Faecal culturing, larvae recovery and identification
- Adult worms recovery from abomasum, intestine, liver and lungs and quantification of worms

The training workshop covered the following topics:

- The classifications of helminth parasites of small ruminants and dogs
- Collection of faecal samples
- Laboratory methods for helminth parasite detection, identification and quantification
- Morphological description of eggs, larvae and adult of gastrointestinal nematodes, flukes, lungworms
- Preservation of eggs, larvae and adult worms
- Coccidia affecting sheep and goats
- Parasites of dogs
- Practical laboratory sessions

The learning approach was participatory. The trainees discussed the content and then the trainers made their presentations using PowerPoints. At the end of each day's training, the trainees each gave comments and suggestions for the next training sessions. In the morning of next sessions, the participants reviewed in a group the training from the day before, the content they covered, the new things they learned and what impressed them most. Then they selected one person from each group to present in plenary.

Pre-training assessment

Before the start of the training workshop, participants were given a quiz containing 20 questions to assess their knowledge and skills in the prepared content of training. In this exam, the trainees got nine points on average out of 20 points. This showed that there was a huge gap in the knowledge and skills in the trainees about the content of the training.

Laboratory practical sessions

Three days were allocated for the practical laboratory sessions. In these sessions the trainees were engaged and actively participated in different laboratory activities. The trainers divided the trainees into four groups (each group contained two participants), which were given different laboratory procedures to conduct and present to the other groups. There was great competition between groups to conduct the procedures and present to other groups. The laboratory technicians of the college were following the groups and guiding each group on procedure and materials.

Post-training knowledge and skills self-assessment

At the end of the training, post-training assessment was done by giving similar questions as in the pre-training assessment to check if the learning objectives were achieved. The training improved the knowledge and skills of the participants, which was evident by the result of post-training assessment. The trainees got 16 points out of 20 points.

Pictures from the training



Fig. a) Trainees practicing laboratory part of the training; b) The group assignment for the presentation; c) Trainees practicing the faecal sample collection from the dogs; d) Examining the sheep head for *Coenurus cerebralis*. Photo credit: Mesfin Mekonnen (ILRI)

Closing remarks and future plans

At the end of the five-day training, Hika Waktole, the dean of College of Agriculture and Veterinary Medicine, Addis Ababa University, congratulated the participants on completing the planned training sessions. He acknowledged the college professors (i.e. Professor Getachew and Professor Bersissa) who coordinated the training. Lastly, he thanked the trainees for following the sessions attentively and punctually.

The researchers acknowledged ILRI and Addis Ababa University College of Agriculture and Veterinary Medicine for organizing and delivering the training, which motivated them for the future research and intervention plans. Finally, the researchers agreed to apply the training on the planned diagnosis and control of gastrointestinal parasites and coenurosis of sheep and goats, which is the core plan of SmaRT Pack project of CRP Livestock.

References

- Ahmed, S. and Ali, L. 1972. Incidence of coenurosis in Bangladesh goat. *Indian Veterinary Journal* 49: 1172 – 1175.
- Njau, B.C., Kasali, O.B., Scholtena, R.G. and Mesfin, D. 1988. *Review of sheep mortality in Ethiopian highlands* (ILCA Bulletin No. 31, Addis Ababa, Ethiopia), 19-22.

Annexes

Annexe I. Training agenda

Part	Lectures	Description	Time allocated for lectures
I	Introduction	<ol style="list-style-type: none"> 1. CoVID-19 prevention rules 2. Gastrointestinal parasitism 3. Classification of helminth parasites of small ruminants and dogs 	Day 1
II	Laboratory techniques	<ol style="list-style-type: none"> 1. Taking faecal samples and transportation of samples 2. Laboratory methods for helminth parasite detection, identification and quantification <ul style="list-style-type: none"> • Direct faecal examination techniques • Floatation techniques • Sedimentation technique • Faecal culturing and larval recovery techniques • Post-mortem recovery of adult worms from abomasum, intestine, liver, lungs 3. Preservation/storage of eggs, larvae and adult worms 	
III	Helminth parasites of sheep and goats	<ol style="list-style-type: none"> 1. Morphological description of eggs, larvae and adult GIT nematodes 2. Morphological description of eggs, larvae and adult flukes 3. Morphological description of eggs, larvae and adult lungworms 4. Treatment and integrated management of helminth parasitism 	Day 1
IV	Coccidia affecting sheep and goats	<ul style="list-style-type: none"> • Classification of coccidian parasites of small ruminants • Morphological description of coccidian of small ruminants 	Day 2
V	Dog parasites	<ol style="list-style-type: none"> 1. Dog cestodes <ul style="list-style-type: none"> • Safety procedures and restraining dogs • Transmission and lifecycle • Morphological description of dog cestode parasites • Taking faecal samples from dogs • Recovering eggs and segments of cestodes from dogs 	Day 2
		<ol style="list-style-type: none"> j2. Dog Nematodes <ul style="list-style-type: none"> • Transmission and lifecycle • Morphological description 	Day 2
Part	Lab practice	Description	Time allocated for practical demonstration and practice

Part	Lectures	Description	Time allocated for lectures
I	Laboratory techniques for helminth parasites of sheep and goats	Taking faecal samples and transportation of samples Demonstrate and practice Laboratory methods for helminth parasite detection, identification and quantification Direct faecal examination techniques Floatation techniques Sedimentation technique Faecal culturing and larval recovery techniques Examination and interpretation of results	Day 3
		Post-mortem worm recovery from stomach and intestine Post-mortem worm recovery from the liver Post-mortem worm recovery from the lungs Preservation/storage of eggs, larvae and adult worms	Day 4
		Practice Laboratory Identification of eggs and larvae of abomasal and intestinal worms Practice Laboratory Identification of eggs and larvae of lungworms Practice Laboratory Identification of eggs of flukes	Day 4
II	Coccidia of sheep and goats	Laboratory diagnosis of coccidiosis in small ruminants	Demonstration parallel to the faecal examination for helminths
III	Dog parasites	Cestodes Practice dog restraining and safe faecal sampling from dogs Identify cestode eggs and segments Examining sheep head for coenurosis	Day 5
		Nematodes Laboratory Identification of eggs and larvae Post-mortem recovery of worms	Demonstration parallel to the faecal examination for helminths

Annex 2. List of participants

1. Tesfalem Nana – Areka Agricultural Research Center
2. Tesfaye Fatalo – Areka Agricultural Research Center
3. Asret Arke – Bonga Agricultural Research Center
4. Nahom Belay – Bonga Agricultural Research Center
5. Firdawok Ayele – Debre Birhan Agricultural Research Center
6. Yeshitila Wondyifrah – Debre Birhan Agricultural Research Center
7. Abebe Tibebu – Sekota Dryland Agricultural Research Center
8. Adane Bahiru – Sekota Dryland Agricultural Research Center
9. Mesfin Mekonnen – International Livestock Research Institute
10. Prof Getachew Terefe – Addis Ababa University, College of Agriculture and Veterinary Medicine
11. Prof Bersissa Kumsa - Addis Ababa University, College of Agriculture and Veterinary Medicine
12. Gebeyehu Alkadir - Addis Ababa University, College of Agriculture and Veterinary Medicine
13. Tadesse Negash - Addis Ababa University, College of Agriculture and Veterinary Medicine
14. Tigist Gizachew - Addis Ababa University, College of Agriculture and Veterinary Medicine