

Report on training of trainers on ration formulation for dairy cattle in Ethiopia



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INITIATIVE ON
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Cover photo: Participants at the training of trainers (ToT) on ration formulation for dairy cattle in Ethiopia. 24–27 October 2022, ILRI, Addis Ababa, Ethiopia. Credit: ILRI/Apollo Habtamu.

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Abbreviations and acronyms

ARARI	Amhara Region Agricultural Research Institute
ACDI/VOCA	Agricultural Cooperative Development International/ Volunteers in Overseas Cooperative Assistance
EIAR	Ethiopian Institute of Agricultural Research
FARP	Farm Animals Ration Program
FCU	Farmers' Cooperative Union
GTP	Growth and Transformation Plan
ILRI	International Livestock Research Institute
LSIL	Livestock Systems Innovation Lab
MoA	Ministry of Agriculture
OARI	Oromia Agricultural Research Institute
SARI	Southern Agricultural Research Institute
ToT	Training of trainers

Acknowledgements

We would like to thank all the stakeholders who contributed to the development of the software and helped in facilitating the training workshop. This training was conducted in collaboration with the University of Florida (UF) Feed the Future Innovation Lab for Livestock System and the University of California Davis College of Agricultural and Environmental Sciences. The training workshop was funded by the Bill & Melinda Gates Foundation under the EQUIP-Feed project and conducted as part of the CGIAR Initiative on Sustainable Animal Productivity. CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land and water systems in a climate crisis. Any opinions, conclusions or recommendations expressed here are those of the authors alone.

Executive summary

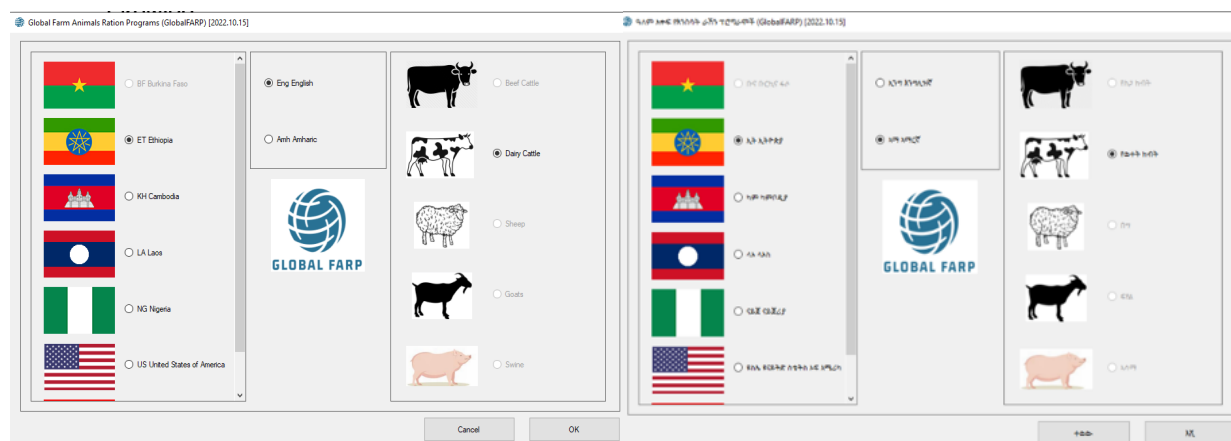
Feed costs contribute more than 70% of the total cost of livestock production, and one of the biggest limitations to enhancing productivity is lack of knowledge on how to meet the nutrition requirements of dairy cattle using locally available feed resources. This is especially true in smallholder farming practices in Ethiopia. In addition, insufficient and low-quality feeds can increase the cows' greenhouse gas emission intensity (emission per litre of milk). Even where relatively good feed is available in semi-intensive production conditions, rations are not properly formulated. Therefore, the animals are typically underfed, leading to considerable productivity gaps and significant losses of potential income. Consequently, ration formulation using appropriate and locally available feed resources can increase dairy cow productivity and farmers' incomes, in addition to reducing the cows' methane emission intensity and overall environmental impact. Thus, a ration formulation software called PCDAIRY_ET_Amh (ration formulation and evaluation software program for dairy cattle in Ethiopia in Amharic language) for formulating least cost and balanced rations based on locally available feed resources to enable accurate feeding of dairy cattle has been developed and shared by the University of California Davis as part of the EQUIP-Feed project. The software was developed in a local language (Amharic) but, when necessary, can easily be translated into other local languages to encourage its adoption and adapted to a local feed library inclusive of current prices and nutritional analysis. Training of Trainers (ToT) on the use of this software was conducted at the International Livestock Research Institute (ILRI) campus in Addis Ababa from 24–27 October 2022. The workshop was attended by enthusiastic participants from government agencies, research institutes, the private sector, farmers' cooperative unions and universities engaged in dairy cattle research, teaching and extension. The participants/trainees are expected to train many other key stakeholders to disseminate the training across Ethiopia.

Introduction

Increasing the productivity of smallholder dairy farms is a high priority for the Ethiopian government as indicated in its Growth and Transformation Plan II (GTP-II)¹ and, more specifically, in the Ethiopia Livestock Master Plan². However, milk production still falls far short of potential due to inadequate quantity and/or quality of available feed resources. This is especially true in smallholder farming systems in Ethiopia. Even where relatively good feed is available in semi-intensive and intensive production conditions, rations are not properly formulated. Therefore, the animals are typically underfed, leading to considerable milk productivity gaps and significant losses of potential income.

Ration formulation using appropriate and locally available feeds can increase dairy cow productivity and farmers' incomes, in addition to reducing the cows' methane emission intensity (emission per litre of milk) and overall environmental impact. This is why the PCDAIRY_ET_Amh (ration formulation and evaluation software program for dairy cattle in Ethiopia in Amharic language) was developed and shared. PCDAIRY_ET_Amh is part of another comprehensive software package called Global FARP (Farm Animal Ration Program), which covers other countries, languages and farm animals. For this training workshop, the software was made available in English and Amharic with an easy-to-use graphical user interface (see Figure 1). A local feed library was established in collaboration with the Ethiopian Institute of Agricultural Research (EIAR), Agricultural Cooperative Development International/ Volunteers in Overseas Cooperative Assistance (ACDI/VOCA) and Hawassa University School of Animal and Range Sciences, who supported the collection and nutritional analyses of locally available feed resources.

Figure 1. Homepage of the Global FARP software (English on the left and Amharic on the right).



To view the site in Amharic, click on 'Ethiopia' then select 'Amharic'. To select dairy cattle, click on the dairy cattle icon then on the 'ኢ.ሺ.' button.

1. Growth and Transformation Plan II (GTP II) (2015/2016 – 2019/2020), 2016. eth169444.pdf

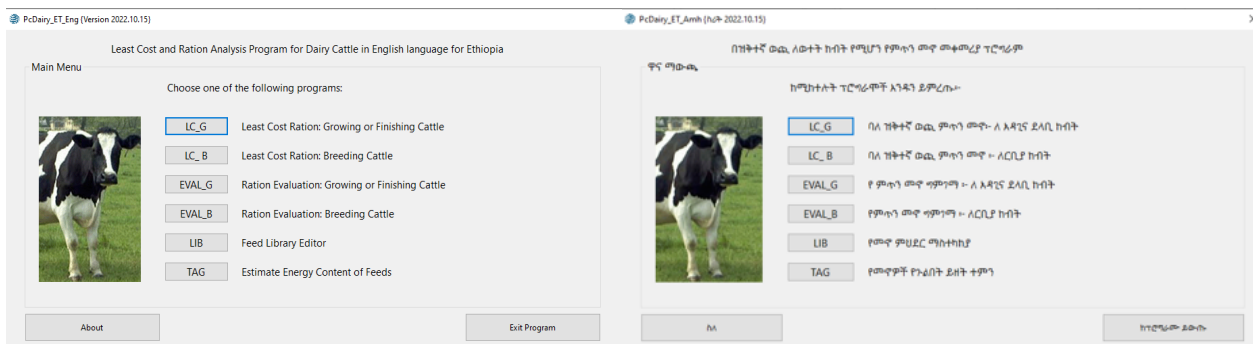
2. Ethiopia Livestock Master Plan, 2015. <https://hdl.handle.net/10568/79153>

Main menu of the PCDAIRY program

As shown below in Figure 2, the main menu of the PCDAIRY program offers six choices:

1. LC_G: least cost ration formulation for growing dairy cattle
2. LC_B: least cost ration formulation for breeding dairy cattle
3. EVAL_G: ration evaluation for growing dairy cattle
4. EVAL_B: ration evaluation for breeding dairy cattle
5. LIB: feed library editor
6. TAG: feed tag program to calculate energy values of feeds

Figure 2. Main menu of the PCDAIRY program (English on the left and Amharic on the right).



The user can use the software to formulate a new ration for growing or lactating dairy cattle or evaluate an existing diet. It is possible to manage feed libraries using the feed library editor and to estimate the energy content of local feeds using the feed tag program. To evaluate or formulate a typical ration for a certain group of animals, the user enters the appropriate information in the following screens:

1. Animal information screen
2. Feed list screen
3. Ration screen
4. Nutrient constraints screen
5. Feed constraints screen
6. Feed group constraints screen
7. Ration constraints screen
8. Reports
9. Feed library editor

Training proceedings

Objectives

The objectives of the ToT were to:

- Train participants in the use of dairy cattle ration formulation software, thus building their knowledge and skills and enabling them to train others.
- Provide information technology-enabled extension support to formulate climate-smart and least-cost rations for improving the productivity of dairy cattle; and
- Demonstrate to participants how to evaluate rations and formulate least-cost balanced rations, thus enabling accurate feeding of livestock using locally available feed resources.

Participants

The ToT workshop was attended by 22 enthusiastic participants (20 male and 2 female) from government agencies, research institutes, the private sector, farmers' cooperative unions and universities engaged in dairy cattle research, teaching and extension. Specifically, individuals representing Hawassa, Haramaya and Bahir Dar universities; EIAR; Amhara, Oromia and Southern agricultural research institutes; the Ministry of Agriculture (MoA); the Agricultural Transformation Institute (ATI); Amhara Livestock Agency; private feed producers; and Wodera, Liban and Sidama Elito farmers' cooperative unions received hands-on training. Project staff from ILRI (Bayissa Hatew – EQUIP project coordinator and Zeleke Mekuriaw – country coordinator for the Feed the Future Livestock Systems for Innovation Lab) organized and facilitated the training workshop.

Methods

The training workshop began with a welcome session, self-introduction of the participants and an explanation of the workshop objectives and training agenda. Afterwards, a discussion on the draft plans of the workshop training was done and the training sessions were conducted as follows:

Day 1

1. General introduction to the PCDAIRY_ET_Amh software.
2. How to download, install and run the software.

The requirements to download and run the software were described clearly. PCDAIRY_ET_Amh software only runs on Windows computers; it does not work on Mac or Linux computers. It is supported by Windows 11 and earlier versions of the Windows operating system, such as Windows 10, Windows 8 and Windows XP. Participants received a manual with detailed instructions on how to download, install and run the Global FARP software.

3. Feed libraries

There are three feed libraries:

- A standard feed library with a capacity of 999 feeds.
- An alternate feed library with a capacity of 999 feeds.
- An unfeasible feed library with a capacity of 999 feeds.

Day 2

Training on evaluation of feeds:

1. Evaluation module: input screens.
2. Evaluation module: output reports.

Day 3

Training on formulation least cost ration:

1. Formulation module: input screens.
2. Formulation module: output reports.

Day 4

1. Group exercises on ration evaluation and least cost ration formulation.

To enrich the outcomes of the group work (see Picture 1), the results were presented and discussed in a plenary session. Participants discussed on opportunities for increasing the application of the software and dissemination of the software for increased number of users. The groups also put forward funding options to enable delivery of this training to larger numbers of users at various levels.

Photo 1. Group work and discussion on ration evaluation and least cost ration formulation.

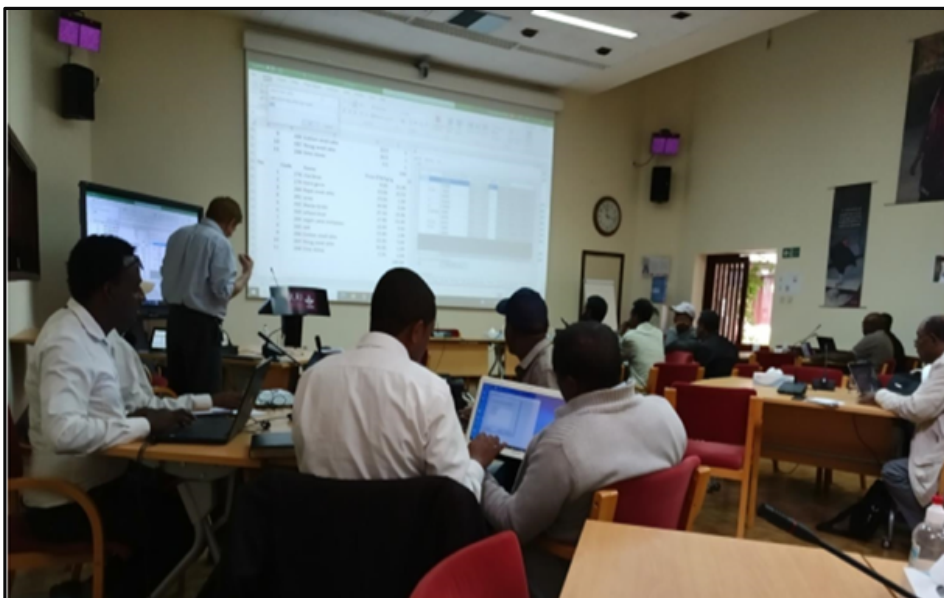


Photo credit: ILRI/Bayissa Hatew.

2. Award session and group photo

Once the discussions were completed, workshop participants were awarded certificates for successful completion of the ToT course on ration formulation for dairy cattle in Ethiopia. The workshop was concluded after a group photograph.

Summary

In the three and a half days of the ToT workshop, extensive demonstrations were provided to help build the capacity of participants in using the PCDAIRY_ET_Amh ration formulation software. Trainees also practised how to evaluate a ration, formulate the least-cost ration with locally available feed resources and ultimately train others. The feedback from the trainees was that the training was interesting, practical, clear and a timely opportunity for Ethiopia. It was also mentioned that the software would not only make it easier for feed manufacturers to formulate proper and low-cost rations that would improve livestock productivity based on locally available feed resources but could also be used as a teaching tool in the universities by integrating the software into the curriculum thus ensuring sustainability. Besides, with the software, young researchers could learn about practical ruminant nutrition and thus formulate feeds that improve animal productivity while reducing greenhouse gas emission intensity among smallholder and commercial livestock producers. Extension agents could also be trained on using the software.

Annex

Annex 1. Program for training of trainers on ration formulation for dairy cattle in Ethiopia

Day	Date	Session	Agenda
Day 1	Monday, 24 October 2022	0830–1215 hours	Welcome note and self-introduction Software installation and introduction
		1215–1315 hours	Lunch break
		1300–1700 hours	Feed libraries
Day 2	Tuesday, 25 October 2022	0830–1215 hours	Evaluation module: input screens
		1215–1315 hours	Lunch break
		1300–1700 hours	Evaluation module: output reports
Day 3	Wednesday, 26 October 2022	0830–1215 hours	Formulation module: input screens
		1215–1315 hours	Lunch break
		1300–1700 hours	Formulation module: output reports
Day 4	Thursday, 27 October 2022	0830–1100 hours	Ration formulation exercises
		1100–1215 hours	Award session and group photo
		1215–1315 hours	Lunch and workshop closure



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Sustainable Animal Productivity

CGIAR's Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) is working in seven countries focusing on livestock value chains to package and scale out tried-and-tested, as well as new, innovations in livestock health, genetics, feed and market systems. SAPLING aims to demonstrate that improvements in livestock productivity can offer a triple win: generating improved livelihoods and nutritional outcomes; contributing to women's empowerment; and, reducing impacts on climate and the environment. Its seven focus countries are Ethiopia, Kenya, Mali, Nepal, Tanzania, Uganda and Vietnam.

