

# CGIAR Initiative on Sustainable Animal Productivity

## Ethiopia dairy cattle herd health interventions stakeholders validation workshop



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Sustainable Animal  
Productivity for  
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and Gender Inclusion

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# Abbreviations and acronyms

BTB	bovine tuberculosis
BVD	bovine viral diarrhoea
CVMA-AAU	College of Veterinary Medicine and Agriculture of the Addis Ababa University
EIAR	Ethiopian Institute of Agricultural Research
FMD	foot-and-mouth disease
IBR	infectious bovine rhinotracheitis
ILRI	International Livestock Research Institute
LSD	lumpy skin disease
MoA	Ministry of Agriculture
RHHM	Reproductive herd health management

# Acknowledgements

This work was conducted as part of the CGIAR Initiative on Sustainable Animal Productivity and is supported by contributors to the CGIAR Trust Fund. CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land, and water systems in a climate crisis.

We also thank the stakeholder experts for their contributions during the co-creation workshop.

# Executive summary

The total cattle population in Ethiopia in 2020 was about 70 million, reflecting a huge potential for milk production. However, more than 97% of these cattle are reared under traditional production systems, with low milk yield leaving the country with one of the lowest levels of per capita milk production and consumption in the world.

The CGIAR Initiative on Sustainable Animal Productivity that is also known as ‘SAPLING’, which incorporates livelihoods, nutrition and gender inclusion, is implemented by the International Livestock Research Institute (ILRI) in collaboration with national and international partners, aims to transform livestock sectors in target countries including Ethiopia by developing, adopting and testing simple, affordable, acceptable and scalable interventions in, for example, dairy cattle. In this regard, SAPLING seeks to improve herd health (population health) through preventative measures (calendared vaccinations, strategic deworming, etc) and implementing good dairy farming practices (as opposed to the traditional ways of only treating animals when they become sick) to enhance dairy cattle productivity and welfare leading to improved productivity, welfare and livelihoods.

A stakeholder workshop on 9 November 2022 at ILRI Ethiopia campus in Addis Ababa, discussed, developed and validated proposed dairy herd health interventions to be implemented under SAPLING in Ethiopia. The herd health plan will start in two districts: Bahir Dar Zuria in Amhara Region and Ada’a in Oromia region. The workshop participants were from the Ministry of Agriculture (MoA), Ada’a District Agriculture Office (Oromia), Bahir Dar Zuria District Agriculture Office (Amhara), Ethiopian Institute of Agricultural Research (EIAR), College of Veterinary Medicine and Agriculture of the Addis Ababa University (CVMA-AAU) and private veterinarians from the intervention sites (Ada’a and Bahir Dar Zuria districts). Project staff from ILRI (Getachew Dinede, Wudu Temesgen, Solomon Gizaw, Dagim Berhanu, Selam Meseret, Melkamu Derseh and Theodore Knight-Jones) organized and facilitated the meeting.

Draft dairy herd intervention plans were developed in the areas of prevention and control of parasites, infectious diseases, and the management of reproductive and related problems. The integration of nutrition and genetic interventions with health interventions in dairy cattle was also discussed. Moreover, the participants identified major animal welfare problems in dairy cattle, an area of interest for SAPLING. Furthermore, the participants discussed the opportunities, challenges and approaches in delivering the interventions through a business model (private veterinary service providers).

Mastitis, calf diseases (diarrhoea, pneumonia, etc.), foot-and-mouth disease (FMD), lumpy skin disease (LSD), pasteurellosis, bovine tuberculosis (BTB), bovine viral diarrhoea (BVD) and infectious bovine rhinotracheitis (IBR) were identified as the major infectious diseases in dairy cattle in Ethiopia. Calendared vaccination, screening and culling (in case BTB) and good dairy farming practices (proper housing, feeding and standard milking procedures, etc.) were suggested as potential interventions to prevent and control these diseases. The participants identified internal parasites including nematodes, *Schistosoma* and liver flukes, with strategic deworming for herds with their own grazing land, periodic selective anthelmintics treatment and awareness creation as potential interventions. In intervention areas where the intensity of infestation is moderate, treatment of only partial or full grazing animals was suggested but in areas where the infestation is high (like *Schistosoma* and liver flukes in Bahir Dar Zuria District), it was recommended to treat both grazing and housed animals as the parasites can be acquired by fresh cut grasses. Ticks and lice were the major external parasites identified. Early detection of ectoparasite infestation during favourable season and pesticide application to deal with the problem were suggested. Restricting animals from grazing long grass and bushes during wet seasons can also prevent tick infestations.

Oestrus management, abortion, retention of foetal membrane, metritis and endometritis, dystocia, phantom cow syndrome and repeat breeding, early mortality and milk fever were identified as major reproductive and related problems for dairy cattle. Use of reproductive herd health management, breeding management, maintaining farm hygiene, feed management, neonatal management and building the capacity of dairy value chain actors were identified as potential interventions to prevent and control reproductive and related problems.

The participants mentioned several animal welfare issues in dairy cattle such as poor housing (insufficient space; substandard floor [unhygienic, slippery]; poor light, poor ventilation and improper feeding of animals [e.g. feeding attention only for milking animals; insufficient water provision; insufficient milk for calves; prohibiting colostrum intake by calves and feeding different age groups together]). Participants mentioned that animals often do not rest properly because of inadequate space per animal, causing the animals to stand day-and-night which can cause swelling of their legs and lameness. The farmers sometimes believe that if a person sees the animals it could make the animals sick, compelling them to tether the animals day-and-night and hide them indoors.

Raising awareness of farmers and health professionals about animal welfare and animal welfare advocacy to develop and enforce animal welfare standards were suggested as potential interventions.

Participants identified inaccessibility of public vet services, regulations favoring privatization of animal health services, the large number of veterinarians and financial opportunities favour the involvement of private vet service businesses in the delivery of dairy herd health interventions. However, several challenges were raised regarding use of private vet service providers which include the high expense of private providers; farmers perceptions that private veterinary services are of low quality because of misconduct; private vet service providers could have limited access to vaccines which are provided by the public vet services, and that public vet services are often subsidized making it difficult for private vets to compete. Linking farmers and private veterinarians; collaboration of public and private veterinary services providers; building capacity of private veterinarians; subsidizing some private veterinary services providers and privatizing some services such as vaccinations were suggested as solutions to help private veterinarians to deliver interventions.

# Introduction

The total cattle population in Ethiopia in 2020 was about 70 million, reflecting a huge potential for milk production. However, more than 97% of these cattle are reared under traditional production systems, with low milk yield per head making the country have one of the lowest per capita milk production and consumption in the world. There are three dairy production system in Ethiopia: traditional rural milk production; smallholder urban and peri urban milk production system, and commercial dairy system. Dairy production has a potential to improve the nutrition, health, incomes, and livelihoods of Ethiopians but the sector first needs to be transformed from the existing dominantly low-input-low-output traditional milk production into a technology supported more productive sector.

The CGIAR Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) aims to contribute to transforming livestock sectors in target countries including Ethiopia to make them more productive, resilient, equitable and sustainable. It will do this by developing, adopting and testing simple, affordable, acceptable and scalable interventions across three main pillars of livestock productivity: animal health, feed and genetics in three value chains (dairy, small ruminants and chicken).

The initiative's dairy herd health management interventions in Ethiopia will start in two districts: Bahir Dar Zuria (Amhara) and Ada'a (Oromia) with about 30 dairy farms per district and to be expanded to other areas after testing in these two districts. The interventions will target small- to medium-scale market-oriented dairy farms that primarily keep cattle to produce dairy products for sale. Interventions will be delivered by private veterinary service providers to sustain the delivery mechanism after the project is phased out.



# Workshop proceedings

## Objectives

The objectives of the workshop were to:

- Discuss and validate a draft dairy herd health interventions.
- Design detail interventions based on a draft plan for prevention and control of parasites in dairy cattle.
- Design detail interventions based on a draft plan for prevention and control of bacterial, viral and other infectious diseases in dairy cattle.
- Design detail interventions based on a draft plan for prevention and control of reproductive and related problems in dairy cattle.
- Identify animal welfare problems and improvement measures in smallholder market-oriented dairy farms.
- Identify opportunities, challenges and approaches in using private veterinary service providers to deliver the interventions.

## Content

In this workshop, the participants discussed the draft plans and designed detail interventions for prevention and control of parasites and infectious diseases, and reproductive and related problems. They also identified major animal welfare problems in dairy cattle. Moreover, the participants identified opportunities, challenges and approaches in using private veterinarians to deliver the interventions. The participants also discussed how to integrate nutrition and genetic interventions with health interventions in dairy cattle (Annex 1).

## Participants

The workshop participants were from the Ministry of Agriculture (MoA), Ada'a District Agriculture Office (Oromia), Bahir Dar Zuria District Agriculture Office (Amhara), Ethiopian Institute of Agricultural Research (EIAR), College of Veterinary Medicine and Agriculture of the Addis Ababa University (CVMA-AAU) and private veterinarians from the intervention sites (Ada'a and Bahir Dar Zuria districts). Project staff from ILRI (Getachew Dinede, Wudu Temesgen, Solomon Gizaw, Dagim Berhanu, Selam Meseret, Melkamu Derseh and Theodore Knight-Jones) organized and facilitated the meeting.

## Methods

The workshop was started by welcoming the participants and describing workshop objectives, agenda and methods followed by self-introduction of the participants. Then the planned dairy health plan was introduced for further enrichment and validation. Participants formed three groups based on their expertise: parasites, infectious diseases, and reproductive and related problems, to review the draft plan, identify additional herd health problems and enrich and validate the herd health intervention in their respective areas of expertise. After the group work, results were presented and discussed in plenary to enrich the outcomes. The groups also discussed animal welfare problems and improvement measures and identified opportunities, challenges and approaches in using private veterinary service providers to deliver the interventions.

## Results

Mastitis, calf diseases (diarrhoea, pneumonia, etc.), FMD, LSD, pasteurellosis, BTB, BVD and IBR were identified as priority infectious diseases in dairy cattle. Vaccination was indicated as the main intervention for FMD, LSD, pasteurellosis, BVD and IBR (Table 1). While nematodes, *Schistosoma* and liver flukes were the identified priority internal parasites; ticks, lice and mange (to some extent) were identified as major external parasites. Strategic deworming for herds with own grazing land, periodic selective anthelmintic treatment and

awareness creation were suggested for helminth problems, and pesticide application and grazing management were recommended for ectoparasites (Table 2). Participants identified oestrus management, abortion, retention of foetal membrane, metritis and endometritis, dystocia, phantom cow syndrome and repeat breeding, early mortality and milk fever as major reproductive and related problems for dairy cattle and proposed intervention for addressing these problems (Table 3).

Participants mentioned poor dairy housing system including insufficient space per animal; substandard floors; poor light and ventilation and poor feeding management as major animal welfare problems in dairy cattle. Participants also said that farmers often have poor awareness of animal welfare. The identified welfare problems and suggested measures are indicated in Table 4.

Inaccessibility of public veterinary services, favourable regulations, many veterinarians and financial institutions that support private businesses could be considered opportunities for using private veterinary service providers to deliver herd health interventions. But there are many challenges in using these private veterinary services providers among them high cost, poor acceptance by farmers (who perceive private veterinarians' services as of low quality and prone to malpractices); lack of access to important drugs and vaccines (which are provided by the government), and subsidized public veterinary services that make private animal health services uncompetitive.

## Prevention and control of infectious diseases

Table 1. Interventions identified during the workshop for prevention and control of infectious diseases in dairy cattle

No.	Major problem	Intervention	Detail intervention plan	Comments
1	Subclinical mastitis	<ul style="list-style-type: none"> <li>Intramammary infusion of dry cow</li> </ul>	<ul style="list-style-type: none"> <li>California Mastitis Test screening prior to treatment</li> <li>intramammary antimicrobial infused into each gland after the last milking of the lactation and left in situ</li> </ul>	<ul style="list-style-type: none"> <li>The major benefits of dry cow therapy are the elimination of existing intramammary infections and prevention of new intramammary infections during the dry period.</li> </ul>
2	Clinical mastitis	<ul style="list-style-type: none"> <li>Intramammary and parenteral antimicrobial treatment</li> <li>Practice standard milking procedures</li> </ul>	<ul style="list-style-type: none"> <li>Combine intramammary and parenteral antimicrobial treatment or use extended intramammary treatment for 4–8 days</li> <li>Hygienic washing and drying of udders before milking</li> <li>Disinfection of hands or use of rubber gloves</li> <li>Milking infected cows last</li> <li>Teat dipping after milking</li> <li>Regular milking-machine maintenance</li> </ul>	
3	Calf disease (diarrhoea, pneumonia, etc.)	<ul style="list-style-type: none"> <li>Neonatal follow up</li> <li>Proper housing</li> <li>Maintain hygiene</li> <li>Proper feeding</li> <li>Rational treatment</li> </ul>	<ul style="list-style-type: none"> <li>Standard neonatal management</li> <li>Proper housing for calves</li> <li>Setting separate calving room</li> <li>Maintain environmental hygiene</li> <li>Proper feeding management</li> <li>Maintain feeding hygiene (e.g., milk for calves feeding should be kept clean to avoid contamination)</li> <li>Prophylactic and curative treatments</li> </ul>	

No.	Major problem	Intervention	Detail intervention plan	Comments
4	FMD	Vaccination	<ul style="list-style-type: none"> <li>• Bi-annual vaccination</li> <li>• Quarantine</li> </ul>	
5	LSD	Vaccination	<ul style="list-style-type: none"> <li>• Annual vaccination</li> </ul>	
6	Pasteurellosis	<ul style="list-style-type: none"> <li>• Vaccination</li> <li>• Antimicrobial treatment</li> </ul>	<ul style="list-style-type: none"> <li>• Vaccination</li> <li>• Strategic use of antibiotics (preventive and curative)</li> </ul>	
7	BTB	Screening and culling		
8	BVD	Vaccination and screening		
9	IBR	Vaccination and screening		

## Prevention and control of parasites

Table 2. Interventions identified during the workshop for prevention and control of internal and external parasites in dairy cattle

No.	Major problem	Intervention	Detail intervention plan	Comments
1	Internal parasites			
	<ul style="list-style-type: none"> <li>• Ada'a District:</li> <li>• Nematodes</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic deworming</li> <li>• Periodic selective use of anthelmintics</li> <li>• Awareness creation</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic deworming for herds with own grazing land (i.e., treat at the start of favourable season to reduce pasture contamination and at the peak of infection to treat infected animals</li> <li>• Examine animals periodically for parasitosis clinically (anemia and weight condition) or egg count and treat only animals that are deemed affected by using benzimidazoles</li> <li>• Awareness creation for the farmers about parasites and grazing and feeding management</li> </ul>	This applies only for partial or full grazing animals not for total in-house animals

No.	Major problem	Intervention	Detail intervention plan	Comments
	Bahir Dar Zuria District: <ul style="list-style-type: none"> <li>• Liver fluke</li> <li>• <i>Schistosoma</i></li> <li>• Nematodes</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic deworming</li> <li>• Periodic selective use of anthelmintics</li> <li>• Awareness creation</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic deworming for herds with own grazing land (i.e., treat at the start of favourable season to reduce pasture contamination and at the peak of infection to treat infected animals)</li> <li>• Examine animals periodically for parasitosis clinically (anemia and weight condition) or egg count and treat only animals that are deemed affected by using anthelmintics               <ul style="list-style-type: none"> <li>○ Fluke (triclabendazole)</li> <li>○ <i>Schistosoma</i> (praziquantel)</li> <li>○ Nematodes (benzimidazoles)</li> </ul> </li> <li>• Awareness creation for farmers about parasites and grazing and feeding management</li> </ul>	This includes totally in-housed animals as the parasite infection is high and can be acquired by feeding fresh cut grass
2	<b>External parasites</b>			
	<b>Both sites</b> (Ada'a and Bahir Dar Zuria districts): <ul style="list-style-type: none"> <li>• Ticks</li> <li>• Lice</li> <li>• Mange (to some extent)</li> </ul>	<ul style="list-style-type: none"> <li>• Ivermectin</li> <li>• Application of pesticides</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal ectoparasite treatment using Ivermectin</li> <li>• Close follow up and application of acaricide or insecticide (e.g., Amitraz, Diazinon) when an ectoparasite is detected.</li> <li>• Give attention during insect season.</li> <li>• Avoid grazing on long grass and bushy areas to avoid ticks and tick-borne diseases during the moist and warm season</li> </ul>	Avoid ivermectin in lactating animals as the withdrawal period for milk is long

## Prevention and control of reproductive and related problems

Table 3. Interventions identified during the workshop for management of reproductive and related problems in dairy cattle

No.	Major problem	Intervention	Detail intervention plan	Comments
1	Estrus management	<ul style="list-style-type: none"> <li>• Awareness creation</li> <li>• Proper nutrition</li> <li>• Use of hormones</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness creation or training of farmers in scheduled evaluation, artificial insemination service, record-keeping, oestrus signs, methods to detect heat</li> <li>• Improving nutrition focused on use of mineral supplements</li> <li>• Use of hormones to induce oestrus</li> </ul>	
2	Abortion (premature death)	<ul style="list-style-type: none"> <li>• Farm hygiene</li> <li>• Proper nutrition</li> <li>• Capacity building</li> </ul>	<ul style="list-style-type: none"> <li>• Keep farm hygiene</li> <li>• Feeding supplementation with vitamins and minerals</li> <li>• Capacity building of farmers and experts</li> </ul>	
3	Retention of foetal membrane	<ul style="list-style-type: none"> <li>• Farm hygiene</li> <li>• Proper nutrition</li> <li>• Capacity building</li> </ul>	<ul style="list-style-type: none"> <li>• Keep farm hygiene</li> <li>• Feeding supplementation with vitamins and minerals</li> <li>• Capacity building of farmers and experts</li> </ul>	
4	Metritis and endometritis	Farm hygiene	Keep farm hygiene	
5	Dystocia	Breeding management	Proper selection of appropriate breed, age, body condition	
6	Phantom cow syndrome and repeat breeding	<ul style="list-style-type: none"> <li>• Oestrus management</li> <li>• Use of reproductive herd health management (RHHM)</li> </ul>	<ul style="list-style-type: none"> <li>• Improving estrus management</li> <li>• Proper implementation of RHHM</li> </ul>	
7	Milk fever (metabolic disease)	<ul style="list-style-type: none"> <li>• Drug treatment</li> <li>• Feed management</li> </ul>	<ul style="list-style-type: none"> <li>• Give 500 ml of 23% calcium gluconate IV</li> <li>• Follow with 2 oral calcium bolus</li> </ul>	
8	Early mortality	<ul style="list-style-type: none"> <li>• Neonatal management</li> <li>• Proper feeding</li> <li>• Farm hygiene</li> <li>• Proper housing</li> </ul>	<ul style="list-style-type: none"> <li>• Improving neonatal and preweaning care</li> <li>• Naval treatment</li> <li>• Proper colostrum feeding</li> <li>• Developing age-based feeding scheme (feed type and formulation)</li> <li>• Improving hygiene and housing for young calf</li> <li>• Clean dry pen</li> </ul>	

## Animal welfare problems in dairy cattle herds

Table 4. Major animal welfare problems in dairy cattle identified during the workshop

Areas	Welfare issue	Impact	Measure
Housing	Insufficient space	Animal unable to move and laydown as they want	<ul style="list-style-type: none"> <li>• Raising awareness of farmers and professionals about animal welfare</li> <li>• as housing is critical animal welfare issue, more advise on housing</li> <li>• lobby for animal welfare directives on issues such as housing (location and space), transportation etc.</li> </ul>
	All time tethering of animals	Animal unable to move	
	Bad and unhygienic floor	Wounds, lameness, and inability to lie down comfortably Poor hygiene causes disease	
	Poor light, poor ventilation, bad location (e.g. near road exposed to noise)	Animals are stressed and do not produce well	
Feeding	Feeding attention only for milking animals and other age classes (calves, heifers etc.) not properly fed		
	Insufficient water provision (usually feed is prepared in semi-solid form and a belief that animals get water from feed)	Thirst and low milk quantity	
	Insufficient milk is given for calves	Poor growth and susceptibility to disease	
	Prohibiting colostrum intake of calves (farmers believe that colostrum may cause calves diarrhoea, preventing calves from suckling colostrum)	Increased susceptibility to disease	
	Feeding different age groups together in which weak and small animals are outcompeted for food	Weak and small animals starved and attacked by powerful animals	
Others	Beating, especially when moving animals to market and veterinary clinics	Pain, fear, stress	
	Welfare unfriendly ethnoveterinary practices (cutting, hot iron application, drenching etc.)	Pain, discomfort, disease, death	
	Poor animal transportation (cruel treatment when loading and transporting on trucks)	Fear, stress, pain, damage	
	Milking cows up until late pregnancy	Weakness, calf birth difficulty and other complications	

## **Herd health interventions delivery mechanism in dairy cattle**

Herd health interventions are planned to be delivered primarily by private veterinary service providers as this delivery mechanism will become a sustainable business between the farmers and the veterinarians because it is likely to increase the income of both farmers and the participating private veterinarians. This mechanism would ensure the sustainability of the interventions after the project is phased out. In this workshop, we identified the opportunities, challenges and approaches in using private veterinary service providers to deliver the interventions as shown below.

### **Opportunities**

- Availability of regulations that support privatization.
  - 267/2000 proclamation –support private involvement in animal health services
  - Rationalization road map document-support privatization.
- Existence of favourable government policy.
- High demand of dairy herd health service as the public veterinary services are not easily accessible and of poor quality
- Availability of many veterinary professionals.
- Existence of already operating veterinary service providers in the target areas.
- Good infrastructure in the target sites.
- Availability of support for entrepreneurs who want to start new businesses.
- Inaccessible public veterinary services
- Insufficient dairy health experts.
- Growth of urban and peri-urban dairy production system.
- Limited working days/hours by public veterinary service providers.
- Unreliable veterinary input from the public veterinary service.

### **Challenges**

- Lack of proper regulation of the private animal health sector.
- Publicly subsidized veterinary services which make the private uncompetitive.
- Problems with drug and vaccine supply for private veterinary service providers.
- Potential malpractices by private providers.
- High profit margin orientation of private providers.
- Perception by farmers that private services are costly.
- Farmers' poor trust regarding the quality of private veterinary services.
- Illegal veterinary services: government veterinarians provide services to get additional income which creates abnormal competition with registered and taxed private services. These government employed veterinarians could also negatively influence the business of the private providers using their authority.
- Private veterinary services are poorly regulated.

### **Approaches**

- Link farmers and private veterinary service providers to establish business services between them.
- Subsidize private veterinary services until the business are well established.
- Support service for private veterinarians to provide quality and efficient services including:
  - Capacity building of knowledge, skills and attitudes (e.g. establish hands on training centres).
  - Facilities support (e.g. refrigerators for cold chain, microscopes etc.).



- Link with the public animal health services to source vaccines.
- Establish farm gate clinical services (e.g. mobile veterinary clinics).
- Collaboration between public and private sectors in providing veterinary services including vaccination.
- Privatizing some veterinary services e.g., vaccination services.

# Annexes

## Annex 1: Program for the CGIAR Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) dairy cattle herd health interventions validation stakeholder workshop

Time	Topic	Owner/facilitators
0830–0900	Registration of participants	Getachew Dinede, ILRI
0900–0910	Participants self-introduction	Getachew Dinede, ILRI
0910–0920	Welcoming remarks and brief points about the CGIAR Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) dairy cattle herd health	Theodore Knight-Jones, ILRI
0920–0930	CGIAR Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) Animal Health component focusing dairy cattle herd health: draft plan, template	Wudu Temesgen, ILRI
0930–0945	Identifying major dairy cattle herd health problems	Wudu Temesgen, ILRI
0945–1000	Animal welfare issues in dairy cattle and measures to address them	Wudu Temesgen, ILRI
1000–1030	Health break	
1030–1100	How to integrate dairy herd nutrition and genetics interventions with health interventions?	Selam Meseret, ILRI and Melkamu Derseh, ILRI
1100–1130	Group 1: Designing interventions for prevention and control of parasites in dairy cattle herds	Wudu Temesgen, ILRI
	Group 2: Designing interventions for prevention and control of infectious diseases (bacterial, viral, rickettsia, etc.) in dairy cattle herds	Getachew Dinede, ILRI
	Group 3: Designing interventions for major dairy cattle herd health problems related to reproductive and related problems management, udder health and calf management	Dagim Berhanu, ILRI
1130–1150	Group 1: Presentation and discussion	Dagim Berhanu, ILRI
1150–1210	Group 2: Presentation and discussion	
1210–1230	Group 3: Presentation and discussion	
1230–1330	Lunch	
1330–1340	Public-private partnership in animal health services system in Ethiopia: HEARD project experiences	Solomon Gizaw, ILRI
1340–1410	Private vet services: opportunities, approaches, and challenges in using private vets in delivering the designed interventions, alternative options to private vets (group discussion)	Theodore Knight-Jones, ILRI
1410–1425	Group 1: Presentation and discussion	Dagim Berhanu, ILRI
1425–1440	Group 2: Presentation and discussion	
1440–1500	Group 3: Presentation and discussion	
1500–1530	Health break	
1530–1550	Group presentations...continued	Getachew Dinede, ILRI
1550–1600	End of the workshop	Theodore Knight-Jones, ILRI

## Annex 2: List of participants

Name	Institution
Theodore Knight-Jones	ILRI
Wudu Temesgen	ILRI
Solomon Gizaw	ILRI
Dagim Berhanu	ILRI
Selam Meseret	ILRI
Melkamu Derseh	ILRI
Getachew Dinede	ILRI
Getnet Assefa	Land O'Lakes
Gashaw Beyene	MoA
Getachew Asmare	MoA
Degwale Getahun	Bahir Dar Zuria District Agriculture Office, Bahir Dar, Amhara
Mesganaw Berehanu	Bahir Dar Zuria District (private veterinarian), Bahir Dar, Amhara
Tadele Kebede	Bahir Dar Zuria District Agriculture Office, Bahir Dar, Amhara
Getachew Teka	Oromia Livestock Development Agency, Addis Ababa
Olyad Tesfaye	Ada'a District Agricultural Office, Bishoftu, Oromia
Geda Regasa	Ada'a District Agricultural Office, Bishoftu, Oromia
Mohammed Adem	Ada'a District Agricultural Office, Bishoftu, Oromia
Biruk Aregaw	Ada'a District (private veterinarian), Bishoftu, Oromia
Belay Temesgen	Ada'a District (private veterinarian), Bishoftu, Oromia
Zewdie Wendatir	EIAR
Bezina Arega	EIAR
Aregitu Mekuriaw	National Veterinary Institute, Bishoftu
Bersissa Kumsa	CVMA-AAU, Bishoftu
Alemayehu Lemma	CVMA-AAU, Bishoftu
Haileleul Negussie	CVMA-AAU, Bishoftu
Fufa Abunna	CVMA-AAU, Bishoftu
Teshale Sori	CVMA-AAU, Bishoftu