



INITIATIVE ON
Sustainable Animal
Productivity

Advanced training for researchers in Ethiopia on sheep and goat semen cooling technique

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International Center for Agricultural Research in the Dry Areas (ICARDA)



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About SAPLING

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.

Acknowledgements

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Background to training

A two-day advanced training session on semen cooling technique was conducted at the Doyogena CBBP site in Ethiopia. The training specifically targeted researchers involved in implementing sheep and goat CBBPs. In Ethiopia, ICARDA and its partners, under the previous CRP program, established ten low-cost reproductive technology laboratories across different regions. These laboratories are equipped with mobile equipment for semen collection, evaluation, and insemination for sheep and goats. More information about these labs can be found at

[Low-Cost, Mobile Reproductive Labs for Better Sheep and Goat Breeding | ICARDA](#). Artificial insemination has been implemented as a means of disseminating improved genetics within the CBBPs and surrounding sheep and goat flocks, known as production units. Artificial insemination offers several advantages in advancing genetic progress, including increased selection intensity, enhanced parental control, improved reproductive management, and prevention of spreading reproductive diseases. So far, small ruminant artificial insemination in Ethiopia relied on collecting fresh semen, processing it, and immediately inseminating the females; the whole process should be carried out at relatively constant temperatures between 37 and 35 °C and the time separating semen collection from deposition should not exceed 20-30 minutes. However, the introduction of semen cooling down to around 15-17 °C brings about significant benefits. Cooling semen extends its shelf life, provides increased access to superior genetics for farmers in distant locations from the improved sires, offers flexibility in organizing inseminations by separating them spatially from semen production, democratizes access to genetics for farmers in distant villages and results in cost savings. This valuable technique contributes to further optimization of the breeding schemes, enhances genetic selection, and improves the overall performance of flocks. Under the SAPLING initiative, four specialized semen coolers have been made available and distributed to the Menz, Bonga, and Doyogena CBBP sites. The semen cooling boxes allow for the preservation for 4 to 6 hours of semen from the best rams in different CBBP villages, which can then be transported to distant locations for insemination. This centralized approach streamlines the process and facilitates the dissemination of superior genetics.

Overall, this training on semen cooling and the availability of specialized semen coolers through the SAPLING initiative marks a significant advancement in sheep and goat breeding practices in Ethiopia, enabling the utilization of improved genetics and enhancing the overall productivity of the flocks in the CBBP nucleus and in the production units.

This report provides a summary of the two-day training session on the utilization of semen cooling techniques. The training took place in the Doyogena CBBP village in Ethiopia and was attended by researchers from various regions across the country.

Location and modality

The training took place in-person at Sarara CBBP village in the Doyogena district of the Central Ethiopia Region. A low-cost reproductive technology lab equipped with the necessary facilities for semen collection and processing was utilized to collect semen from carefully selected and trained superior sires. Trainees were responsible for collecting semen, assessing its quality, processing it,

and filling straws under a tent. The trainees are already very familiar with semen handling as they are already members of the CBBP large team in charge of implementing inseminations with non-cooled semen. To power the equipment required for semen evaluation, such as microscopes and spectrophotometers, a generator was utilized. Trainees were instructed on how to operate the cooling box and properly place the semen inside. The filled straws were then placed in the box, and their quality was monitored every hour under a contrast-phase microscope fitted with a heating plate for a duration of five hours. The test was repeated on several ejaculates from various sires as there are variations between males regarding the effect of cooling on semen quality and viability.

Dates

The semen cooling training took place for two days on October 10 and 11 2023. Sire selection and training to provide viable ejaculates In an artificial vagina was held between 3 and 9 October 2023 by the Areka research center CBBP team.

Who conducted the training

The training was organized by SAPLING small ruminant team at ICARDA and Areka Agricultural Research Center in Ethiopia. This informative training session was led by Mourad Rekik (Principal Scientist Small Ruminant Physiology and Management) and Tesfaye Getachew (Small Ruminant Breeder) both from ICARDA. Participants who have received advanced training in various topics of small ruminants reproduction and reproductive biotechnologies in previous occasions, were quickly introduced to the topic of semen cooling and the advantages that may offer in making artificial insemination campaigns more efficient and breeding schemes achieving a wider impact. They were then invited to repeatedly practice all steps from collection to cooling and evaluation several times.

Objectives of the training

The purpose of this training is to enhance the knowledge and skills of participants in the areas of semen cooling techniques as well as to engage in discussions regarding its application in facilitating dissemination of superior genetics and allowing community-based breeding programs have a wider impact in the various Ethiopian sites.

Training agenda

10 to 11 October, 2023			
	Time	Session	Who
Day 1	9:00 to 18:00	Approval of selected rams and preparation	Areka Research Center
	14:00 to 18:00	Update from all sites regarding the progress of reproduction work	Adissu, Shanbel and Dereje
Day 2	07:00	Depart from Sodo to Doyogena	ICARDA
	09.00	Welcome, objectives and expectations, and introduction at Doyogena CBBP village	Tesfaye, Mourad
	9.20	Brief explanation about Doyogena sheep CBBP	Kebede
	9:20 to 17:00	Training on semen cooling techniques and its practical application • Semen collection • Semen evaluation and filling into straw • Cooling • Quality control of the cooled semen every hour for a duration of five years	Mourad and team

Training participants

A total of 14 participants from various regions across Ethiopia, including Tigray, Amhara, Oromia, South Ethiopia, Central Ethiopia, Southwest Ethiopia, and Assosa, along with the Ethiopian Livestock Development Institute, attended the training. Trainees were selected within the CBBP partner institutions having a good performance in running CBBP and the associated reproductive technology activities. Six level CBBP leaders were invited to be part of the training. The event provided an opportunity for researchers to enhance their capability in the area of semen handling, processing and cooling, hence Increasing the shelf life of semen and attaining new villages and communities for the dissemination of improved genetics. It was also an opportunity for the participants to exchange between them and with the trainers regarding ongoing reproductive interventions (synchronization, pregnancy diagnosis, sire certification, artificial insemination...).

Next steps

The cooling boxes have been provided to the institutions, specifically Debre Berhan, Bonga, and Areka Research Centers, enabling them to further practice and fine tune the colling process to their contexts and conditions. These institutions are expected to progressively introduce the artificial insemination protocol using fresh, cooled semen along the conventional protocol that is based on

the immediate use of fresh semen without cooling. Following the successful implementation and outcomes observed in these initial sites, the plan is to make the cooling boxes available to the remaining sites, extending the benefits of this technology to a broader range of locations and breeds.

Photos



Artificial insemination rams of Doyogena sheep breed.



Seeting up equipments and training under the tent



Semen collection activities



Semen processing activities



Set up and manipulation of the semen cooling box



Checking semen quality after storage

Annex 1: List of participants

	Name	Institution
1	Zelalem abate	Bonga Agricultural Research Center
2	Adisu G/Michael	Bonga Agricultural Research Center
3	Shanbel Besufekad	Debre Berhan Agricultural Research Center
4	Zelege Tessema	Debre Berhan Agricultural Research Center
5	Mebrahtu	Abergelle Agricultural Research Center
6	Mulatu Gobeze	Sekota Dryland Agricultural Research Center
7	Bekahegn Wondim	Andassa Agricultural Research Center
8	Zemedkun Difabachew	Mekdelaba University
9	Dugassa Desalegn	Haramaya University
10	Tusa Gemechu	Bako Agricultural Research Center
11	Kebede H/Giorgis	Areka Agricultural Research Center
12	Dereje Dea	Arba Minch Agricultural Research Center
13	Ermias Belete	Wolaita Sodo Agricultural Research Center
14	Dagne Muluneh	Livestock Development Institute