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Upscaling of community-based breeding programs in Ethiopia

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ICARDA

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ICARDA Science for resilient livelihoods in dry areas

CIAT International Center for Tropical Agriculture Since 1967 Science to cultivate change

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Upscaling of community-based breeding programs in Ethiopia

Background

In Ethiopia pilot community-based breeding programs (CBBPs) have been designed and implemented since 2010 by a team of researchers from the International Center for Agricultural Research in the Dry Areas (ICARDA), the International Livestock Research Institute, BOKU University, Austria and Ethiopian National Agricultural Research Centers. These programs were evaluated and found to be technically feasible to implement, result in measurable genetic gains and socioeconomic benefits to the rural poor. The Ethiopian Government has accepted CBBP as the strategy of choice for genetic improvement of small ruminants. Consequently, the Livestock and Fisheries sector development projects has adopted CBBP and CBBP is being upscaled in Ethiopia through partnership between Ministry of Agriculture and ICARDA. ICARDA was subcontracted to technically assist the upscale operation and a formal contract was signed in December 2019. This brief report outlines the accomplishments of the project during November 2020 to November 2021.

Components of the project: The major activities to be undertaken in the project are the following:

1. Strengthen small ruminant community-based breeding programs (CBBPs)
2. Design breeding structure and disseminate improved genotype
3. Establish database and recording system
4. Monitor and evaluation of the breeding program
5. Market linkages
6. Establish field solutions for dissemination of improved genetics

Plans for the reporting period and accomplishments

1. Training of trainers on upscaling of community-based breeding program

Several trainings were carried out during the reporting period and are listed below.

- Filed TOT on reproduction technology (Estrus synchronization, semen collection, processing and insemination); 16 to 19 May 2021, Konso; 12 participants, all male
- TOT on reproductive technologies (mass synchronization, Artificial insemination, certification of improved sires) for researchers and ministry livestock experts (face to face): 23 to 25 November 2021, Debre Berhan; 21 participants and 2 female.
- Training on essentials of community-based breeding programs was given to academic staff from 20 local universities in Ethiopia in two phases- in Bahr Dar and Bishoftu (face to face): 20 July, 2021 (25 participants, 1 women); 27 July, 2021 (19 participants, 2 women)
- Training on breeding data collection, management and analysis was given to 25 academic staff from 24 local universities in Ethiopia (face to face): 11 and 12 November 2021, Adama; 25 participants and 2 female

- TOT on upscaling of CBBP focusing on collection and management of data, animal identification and startup of CBBP was provided to 28 researchers, extension staff of the ministry from three regions (Amhara, Oromia and South) and federal bureau of Ethiopia (face to face): 01 and 02 September 2021, Bishoftu; 28 participants and 3 female
- Enumerator were given on the job training on collection of baseline data, animal identification and startup of CBBP in all the upscale sites by national researchers (face to face): At least 13 sites from the three regions (Amhara, Oromia and South)-total of 15 enumerators

2. Training of trainers on reproduction focusing on Artificial insemination

Human resource capacity development is crucial for the sustainability of the CBBPs. Training of trainers on artificial insemination (breeding female selection, synchronization protocol, semen collection, processing and insemination were given for researchers at Arba Minch and Jinka research Centers and experts from Konso zonal, karat zuria and kolme district livestock offices. They were engaged in all the tasks under the supervision of the senior experts. A working team and resources were mobilized from ICARDA and different research centers (Bonga, Debre Berhan, Doyogena, Jinka and Sekota) to assist the training and artificial insemination campaign. Four technical teams were organized for ultrasonography, semen collection, processing and insemination. Each team was led by a senior and trained researcher. In this training of trainers, a total of 20 participants were trained.

Another practical training on sheep and goat artificial insemination has been planned for about 23 participants at Debre Berhan Research Center for experts coming from regional LFSDP, extension, Universities and research centers.


Training on goat reproductive technologies in Konso

3. Field implementation of upscaling

Following the upscaling trainings, a team of researchers and extension staff were engaged in identification of participant households based on criteria provided, collection of baseline data, animal identification, and startup of CBBP in areas where there has been no CBBP and dissemination of improved genetics in areas there existed old CBBPs. As detailed in the Table 2, five hundred three improved sires (160 bucks and 418 rams) were purchased and transferred from CBBP to production sites involving 2954 households and targeting about 12000 breeding females. Routine animal data recording is going on.

In the year 2021, a total of 2,954 households has been involved in the upscaling program (944 in Amhara, 715 in SNNPRS, 245 in Sidama and 1050 in Ormia). Then, the total number of household participating in the upscaling program reached households (2146 in Amhara, 1384 in SNNPRS, 1602 in Oromia, 245 in Sidama, 114 in Tigray).

Table 1. Number of households and sires disseminated to the different sites in the three regions

Region	**Site**	**Species targeted**	**Households targeted**	**Number of sires disseminated**	**Breeding females targeted**	**Partners**
Amhara	Fagta	Sheep	196	49	980	LFSDP, LA, Injibara University, ICARDA
	Baso	Sheep	150	15	300	LFSDP, LA, Debre Berhan research, ICARDA
	Moretna Jiru	Sheep	120	12	240	LFSDP, LA, Debre Berhan research, ICARDA
	Menz	Sheep	390	78	1560	LFSDP, LA, Debre Berhan research, ICARDA
	Gonder Zuria/ Lay Armacho/ Belesa	Goat	88	22	440	LFSDP, LA, Gonder research, ICARDA
Oromia	Meta Wolkite	Sheep and goat	250	50	1000	LFSDP, LA, Holeta Research Center, ICARDA
	Finchawa	Sheep	71	45	900	LFSDP, LA, Bako research, ICARDA
	Kore	Sheep	83	60	1200	LFSDP, LA, Adami Tullu research, ICARDA
	Haromaya	Goat	193	55	1100	LFSDP, LA, Haromaya University, ICARDA
South	Abera	Sheep	245	49	980	LFSDP, LA, Hawassa research, ICARDA
	Konso	Goat	290	58	1160	LFSDP, LA, Arbaminch research, ICARDA

	Doyogena	Sheep	225	45	900	LFSDP, MoA, Areka research, ICARDA
	Bonga	Sheep	200	40	800	LFSDP, LA, Bonga research, ICARDA
Total			**2954**	**578**	11560	

Farmers training in Menz upscaling site

Washera breeding rams ready for dissemination

Selected Washera rams distributed to users in Fagta District

Dissemination of improved rams in Baso district

Breeding bucks transferred to the communities in Konso

4. Strengthening of existing CBBPs

Because of the security situation in the country, we have not supported all existing CBBPs. For example, the Tigray CBBPs were not accessed at all. Additionally, CBBPs in Amhara are also partly affected. However, Menz (5), Abergelle (5), Maksegnit (2); Oromia: Horro (2), Meta wolkite (2), Haromaya (2), Kore (2); South: Konso (5), Doyogena (8), Bonga (15), Abera (6); were strengthened through provision of required materials (ear tags, markers, applicator, weighing

scales) and trainings to researchers, enumerators and farmers. Consequently, these CBBPs were able to produce improved sires which were distributed to the production sites.

Flock of Menz sheep

5. Establishment of field solutions (synchronization and artificial insemination) for dissemination of improved genetics

Dissemination of improved sires from CBBPs could be done through either natural mating and/ or artificial insemination. In Konso goat CBBP, more than 1900 breeding does were checked for pregnancy using ultrasound. Among them a total of 580 does were tested negative for pregnancy and received two injections of Enzaprost hormone 11 days apart to synchronize estrus. A fixed time insemination between 48 to 56 hours after the second injection was carried out. Finally, about 500 Konso breeding goats were inseminated artificially using superior bucks. In addition, as part of the upscaling program 260 Doyogena ewes and 340 Bonga ewes were synchronized and inseminated using top selected rams.

For the Konso AI campaign, a working team and resources were mobilized from ICARDA and different research centers (Bonga, Debre Berhan, Doyogena, Jinka and Sekota) across the country. Four technical teams were organized for ultrasonography, semen collection, processing and insemination. Each team was led by a senior and trained researcher. Household members including kids and women were participated in availing and managing breeding does and bucks during the implementation of pregnancy detection, semen collection and insemination.

Semen collection, processing and insemination in Konso goat upscaling program

6. Establishment of database and recording system

Performance and pedigree recording is crucial to make decision on selection and managerial purposes. Enumerators in all CBBPs are routinely recording performance data either on recording books or for some CBBPs using mobile app. The data collected is recorded in Dtreo (our data recording and management platform developed in partnership with AbacusBio from New Zealand). Data collections using Detro is ongoing in 27 CBBP sites across Ethiopia. So far, more than 100K animals 125K weight and 23K goat milk were recorded in the digital database. The up-to-date information generated from the platforms has been used for estimated breeding values and animal rankings that are directly channeled to breeder organizations to inform breeding decisions. To provide a more accurate picture of the genetic evaluation of small ruminants in the country, the database reach would need to be expanded to include more CBBP sites. We are also working to include additional features in the platform, which could generate breed level information reports, breed-specific prediction equations and animal rankings.

However, routine data collection is not mandatory in the upscaling sites as they are always recipient of improved genetics from the older CBBP flocks. We developed a light sire monitoring format to for the upscaling sites which helped to monitor the status of disseminated sires. Development agents is working on this format and report the status of sire, number of animals born from the disseminated sires and any other related information to the district level experts

7. Market linkage establishment

For the benefit of CBBP upscale to be fully materialized market linkage for both breeding and meat animal is crucial. The upscale operation has created lucrative market for breeding sires as large number of animals are being purchased and disseminated from CBBP sites through LFSDP, livestock agencies of the regions and some NGO's (Table 1). This is encouraging and breeding cooperatives are benefiting from this. Our sustained effort to link our breeding cooperatives with export slaughterhouses finally succeeded and we were able to link Konso breeders with

Allana slaughterhouse as a test model with 97 goats bought. After slaughtering the 97 konso goats, the management of Alana export abattoir informed us there was no darkening of the chilled carcass until it was shipped staying for 24 hours in the cold room. As per the requirements of the regulatory authorities and our plan to follow up the condition of the product in the end market, Allana export abattoir marked all the chilled carcass exported to Dubai market. Moreover, the export abattoir requested feedback of consumers on the quality of the carcass with marked codes. Accordingly, the end market consumers sent their feedback with pictures to Allana confirming there was no problem of darkening on all the marked carcasses for which feedback was requested. This result is the initial step to prove false allegations placed on the quality of Konso goats meat. The result is communicated to all actors involved in the process to realize the test slaughter at Alana export abattoir. The experience from Konso market linkage shall be used to establish similar initiatives in all sites.

8. Establishment of breeders cooperatives

Breeders cooperatives have been found to be effective institutions for implementation and overall running of CBBPs. Consequently, in all the project sites we have established legal cooperatives with clear by-laws following a proven procedure. The actual establishment of the cooperatives is done by the cooperative's bureau of each district, through awarding a legal license. The formally registered cooperatives have by-laws and a formal organizational structure. In most CBBPs, the organizational structures are similar, and three groups of committees manage the cooperatives: a main committee with a chair, a procurement committee, and a control committee. The committees are believed to be responsible for effective functioning of the breeding cooperatives and roles and responsibilities are shared among the committees. It was also learned that formally registered cooperatives are governed by their by-laws and members abide by the rules. Better management of the cooperatives and financial resources, better selection and management of breeding rams was observed among the legally registered cooperatives. Formally registered cooperatives have access to free auditing services from district cooperative promotion offices and financial record-keeping training and support. So far, five breeders cooperatives have been established. These cooperatives, although established as breeding cooperatives, could be used as entry point for other interventions too.

9. Routine data recording to help with identification of best sires will be implemented

Data recording varies based on whether the site is a production site of a nucleus CBBP. In the nucleus CBBP sites we record data on all animals for the identified goal traits. The information is then used for selection decision. However, in the scale up (production sites) we don't record all animals. We record a small group of households with the objective of using the data ultimately to evaluate the progress made.

10. Procurement of operational materials

For effective implementation of the project, items needed were procured and are being distributed when needed. Ear tags, ear tag markers, applicators, weighing scales, veterinary supplies and drugs were procured from the local markets and are being used. Additionally, lab items, consumables and synchronization hormones were imported. As part of implementation of reproductive technologies, two mobile laboratories are being established in Injibara and Haromaya Universities. These labs are low-cost AI labs which are capable of doing basic hormone synchronization and AI in both sheep and goat. The labs are equipped with the required supplies including ovine caprine accuread photometer with a cost of around 160000 Birr per lab.

Conclusion

Trainings at different levels (research, extension and enumerators) on different subjects (CBBP upscale, reproductive technologies, data recording and management) were carried out. Strengthening of existing CBBPs, identification of the best sires based on estimated breeding values, purchase and dissemination of improved sires (total of 578 sires), covering 2954 new households was also done. Mass synchronization and artificial insemination and market linkages were also the focus during the reporting period. Although the security situation in Tigray and part is Amhara has affected our activities in the regions, we believe that the targets set for the year are met. The focus in 2022 shall be on expanding to more villages and households, implement mass synchronization and artificial insemination, and establishment of market linkage for breeding sires and meat animals.