Knowledge products emanating from community-based breeding programs are integrated into animal science programs in institutions of higher learning

Small ruminant value chain

Berhanu Belay, Aynalem Haile, Mourad Rekik, Tesfaye Getachew and Barbara Rischkowsky

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Contents

Acknowledgements

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Outcome

The community-based breeding program (CBBP) has shown remarkable success. It pools the village's small ruminant flock, measures and records performance and pedigree data, and conducts genetic evaluation. The program has led to tangible achievements, such as improved productivity, increased farmers' income, and enhanced family food security. For example, farm-level meat consumption increased from the slaughter of one sheep per year to three. These outcomes inspire hope for the future of sustainable animal productivity.

Despite being launched in 2009 with the collaboration and support of research institutes, livestock extension services, the International Livestock Research Institute (ILRI), the International Centre for Agricultural Research in the Dry Areas (ICARDA), and BOKU, the participation of Ethiopian universities in the CBBP was notably lacking, considering their extensive reach across all regions and diverse Agro-ecological settings. The scaling approach initiated based on the framework developed by Mueller et al. (2019) has triggered the engagement of more partners, including universities, in the expansion of sheep and goat CBBPs. Ethiopian Universities are latecomers; however, they are supported by more than 62 CBBP villages, benefitting 6300 households and investing 1.2 million USD in enhancing teaching, research and community engagement. The practice and knowledge of CBBP are also integrated into the curriculum by influencing the curriculum policy. More than 31 curricula that benefited more than 1120 students per year have integrated CBBP into the UG programs. The lessons from the undergraduate (UG) programs have also given the impetus to integrate CBBP into the postgraduate (PG) program, and more than 43 curricula have integrated CBBP into the curricula, which benefits 345 students per year. The survey conducted to ascertain the relevance of supporting and establishing CBBP under the support of universities and the integration of the CBBP knowledge in the curriculum is highly (88-100%) endorsed in the face of the university community.

Partners

In 2021/22, universities with agriculture colleges were not just encouraged, but their active participation was sought to allocate resources towards initiating CBBP villages and revising their undergraduate and postgraduate courses and programs to incorporate CBBP. Their role in integrating local data and practices into their teaching and learning influenced their academic policy and ensured the dynamic nature of the curriculum based on the principle that a curriculum should accommodate contemporary knowledge products. The universities played a crucial and valued role in the success of the CBBP initiative, providing the necessary resources and integrating the program into their academic policies.

The community-based breeding program requires the full participation of partners with specific roles and complementarity. ICARDA, ILRI, National Agricultural Research System (NARS), Ministry of Agriculture (MoA), development partners, small ruminant-keeping community, community organizations and women's groups are partners which played roles in the development, packaging and dissemination of SmartPack innovations over the last 13 years of CBBP initiation. The ICARDA, BOKU, ILRI and NARS were pivotal in the design of the CBBP. The partners such as ICARDA, BOKU and NARS are the major partners in the generation of knowledge products and subsequent packaging and dissemination of the innovations and enhancements of adaption of innovations through developing scaling framework. The engagement of ICARDA was substantial and supported the program sustainably. The major and quick-win initiative was the integration of the CBBP into the University program. The idea of integrating CBBP into a curriculum was conceived, a workshop that engaged universities was organized, and a committee was set up from senior animal breeders, steered by ICARDA. Through continuous engagement, workshops, visits to universities, and committee efforts, ILRI/ICARDA and 31 universities signed a memorandum of understanding to work together in curriculum development and community-based breeding program village support/ MoU/. The committee analyzed the gap in postgraduate (PG) and undergraduate (UG) programs in Animal breeding courses in capturing CBBP and suggested its integration as a chapter and sub-chapter in the Animal breeding course. The committee's recommendation was forwarded to more than 32 universities for

implementation. Universities have adopted the integration of CBBP into both UG and PG programs. The revamped curriculum is being used to benefit the students and staff.

Why did we do this research?

Small ruminants contribute substantially to the livelihood of the rural poor as well as those of the value chain actors. However, the sector faces many challenges, including a lack of appropriate genetic improvement programs and associated delivery pathways for the best genetics. CBBP has been pilot-tested in various production systems and contexts as an attractive option to the often-failed centralized nucleus breeding program and crossbreeding. For CBBPs to make the desired impact, the scheme needs to be implemented at scale and by producing a skilful future livestock workforce, which could be engaged as private investors, researchers, university staff, and extensionists to be properly trained on the basics and application of the program. It is with this background that the collaboration with universities was initiated and has the following benefits:

- Scaling of CBBP- Twenty-three universities have invested in establishing 63 CBBPs in nearby villages and hence play a role in the dissemination of the innovation
- Curriculum influence- 31 Universities have incorporated CBBPs in their undergraduate curricula, and 38 post-graduate programs have integrated them into their curricula
- The CBBP initiative has not only benefited the universities' mandates of teaching-learning, community engagements, and research but also enhanced their academic and research capabilities. By establishing CBBP villages and using them as learning and research hubs in community settings, the universities have gained real-world research opportunities and community engagement, thereby contributing to the triple mandate of universities.
- Access to data- Data Generated from the CBBPs is being used by PG students, making the learning and teaching more relevant and contributing to the improvement of local needs
- Genetic conservation through utilization: The local breeds are characterized and sustainably improved, warranting the resilience, sustainable uses, and conservation of the local stock.

Evidence

The evidence was captured through a scanning previous report on the integration of CBBP in the Animal Sciences curriculum and a questionnaire survey of the University leaders and staff teaching the amended course with CBBP. Expanding of the CBBP under the support of the universities was initiated in 2021/2022. As we stand today, there are more than 62 CBBP villages, of which 10 CBBP villages are women-led run by 23 universities, investing 1.2 million USD and benefiting more than 6200 small ruminant-keeping households (https://cgspace.cgiar.org/bitstreams/3ebef9ad-b1a5-4fd0-9d18-3f0bc49506d7/download).

Evidence of the integration of CBBP in the university program could be ascribed as:

- **Curriculum integration with CBBP:** More than 31 curricula that benefited more than 1120 students per year have integrated CBBP into the UG programs. The lesson from the UG programs has also given the impetus to integrate CBBP into the PG program, and more than 43 curricula have integrated CBBP curricula, which benefit 345 students per year https://cgspace.cgiar.org/server/api/core/bitstreams/3ebef9ad-b1a5-4fd0-9d18-3f0bc49506d7. In support of the teaching and learning, a guideline for setting CBBP (Haile et al., 2019) has been developed and is serving as reference material for teaching in the UG and PG programs, which captures local data and experiences, ensuring the relevance of the learning https://cgspace.cgiar.org/bitstream/handle/10568/103248/cbbp_guidelines.pdf. The minutes of the university's organ signed by the department council demonstrate the amendment of CBBP in the curriculum and serve as evidence per the memorandum of understanding. https://cgspace.cgiar.org/server/api/core/bitstreams/75371e43-55f2-4a9b-9e99-7c52376c286a. This has also become a lesson and a practice among universities to amend a curriculum with new knowledge products in other disciplines of universities where contemporary climate knowledge products have been incorporated into climate-related courses with the support of the AICCRA project https://hdl.handle.net/10568/135190.
- **CBBP integration in the university community engagement program.** CBBPs serve as a learning laboratory where undergraduate students practice routine small ruminant husbandry practices such as ear tagging, deworming, measuring, weighing, foot trimming, and feeding. Postgraduate (PG) programs have utilized data generated in the CBBPs for thesis research. Mobile Artificial Insemination facilities are operational at three universities: Haramaya University, Mekdella Amba University, and Injibara University. The AI facilities and laboratories, primarily designed to disseminate the best sire/genetics, also serve as teaching labs for reproduction courses. This allows students to gain hands-on experience in semen collection, lab analyses, semen quality assessment, grading, packaging, distribution of fresh semen, and insemination. Over 120 students per year benefit from the lab infrastructure, which contributes to enhancing the quality of education/ REF/. The CBBP villages operating in the proximity of universities are also enhancing community services and linking up teaching and learning with community services. https://hdl.handle.net/10568/135591.
- **CBBP guide and scaling framework manual**: The CBBP guide and scaling framework that has been developed based on research evidence and innovations has served as reference material in teaching animal breeding and sheep and goat courses both in the UG and PG programs. https://hdl.handle.net/10568/168562 and Guidelines-for-setting-up-community-based-small-ruminants-breeding-programs-Second-edition.pdf
- **Questionnaire survey:** A questionnaire was developed to ascertain the relevance of integrating CBBP knowledge products into the curriculum of the PG and UG programs and serve as evidence in the preparation of the outcome story. Google Forms was used to organize the questionnaire. The questionnaire was structured on a Likert scale. The respondents were researchers, teaching staff and university leaders in their respective universities. The questionnaire was forwarded online to 40 respondents, and 34 responded with a response rate of 85%. The results of the survey could serve as evidence in this outcome story. Fig 1 presents the CBBP integration across different programs in 31 Universities.

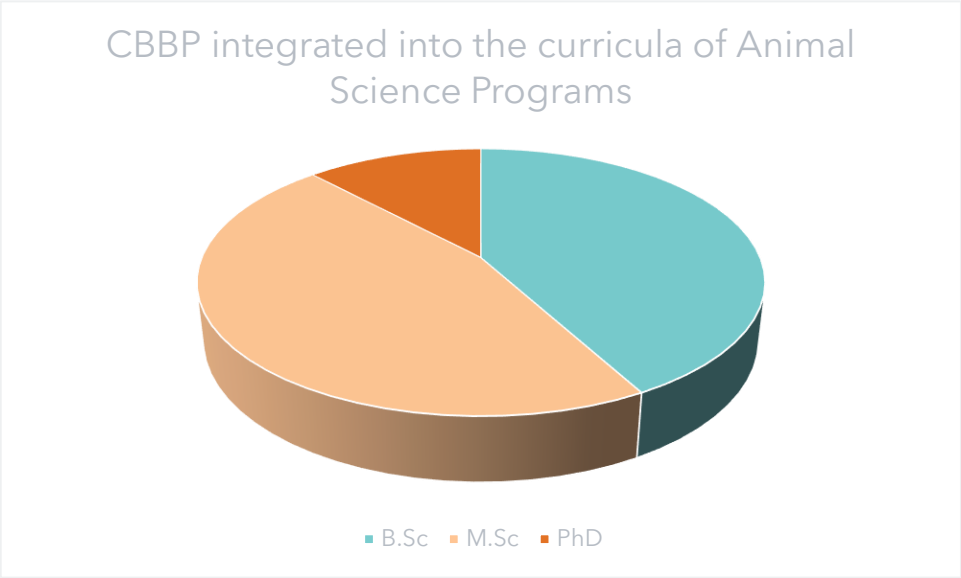

Figure 1. CBBP integrated into the curricula of Animal Science across programs.

The community-based breeding program is highly accepted by the community (87.9%), as depicted in Figure 2, and this has led to a scale-up of the CBBP innovations being implemented by different stakeholders, including universities. The acceptance of CBBP in the face of the community is attributed to an increase in productivity, income and family nutrition (Gutu et al., 2017)

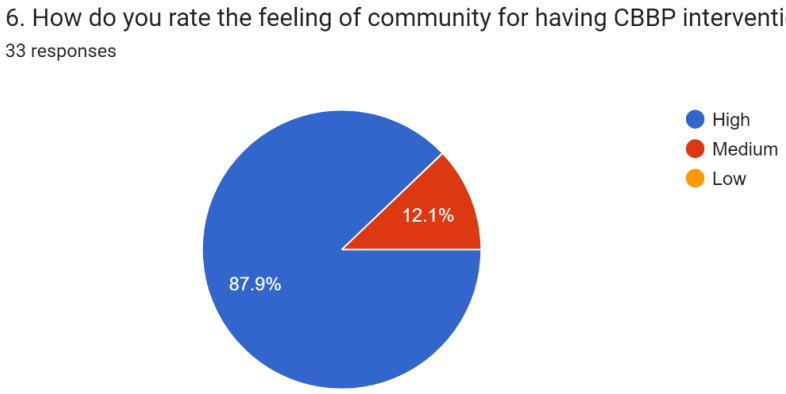

Figure 2. Shows the community's acceptability of the CBBP.

The respondents testified as (high and very high) 99%) to the relevance of the CBBP integration in the curriculum (Fig 2). The experience was extended to the PG program and climate-related courses. The integration of CBBP has also improved the understanding of the course by providing local data.

The integration of CBBP, as perceived by 88.2 %, is rated as very good on the 5-level Likert scale (Figure 3). The university staff teaching the course gave testimony indicating the relevance of updating the curriculum with contemporary knowledge products and ensuring its dynamic nature. This has also improved students' understanding of the subject (Figure 4) and academic achievements (Figure 5). Integrating the local data and practice could have raised the students' interest in following and understanding the subject matter.

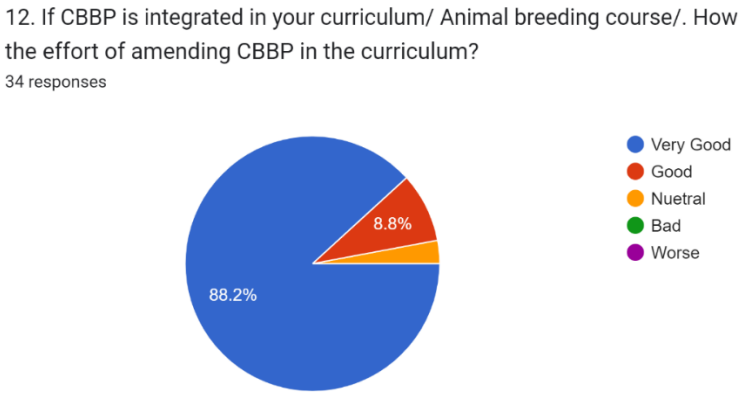

Figure 3. The relevance of integrating CBBP in the curriculum as indicated by respondents.

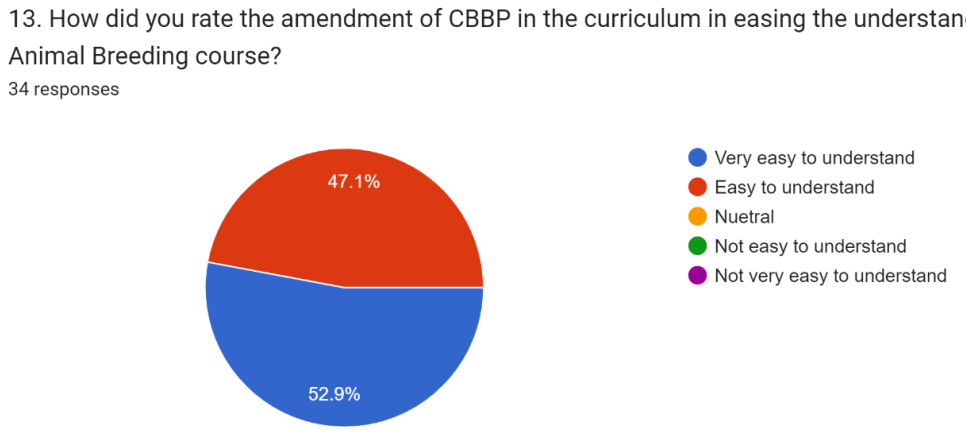

Figure 4. CBBP's integration into the curriculum creates an understanding of the subject.

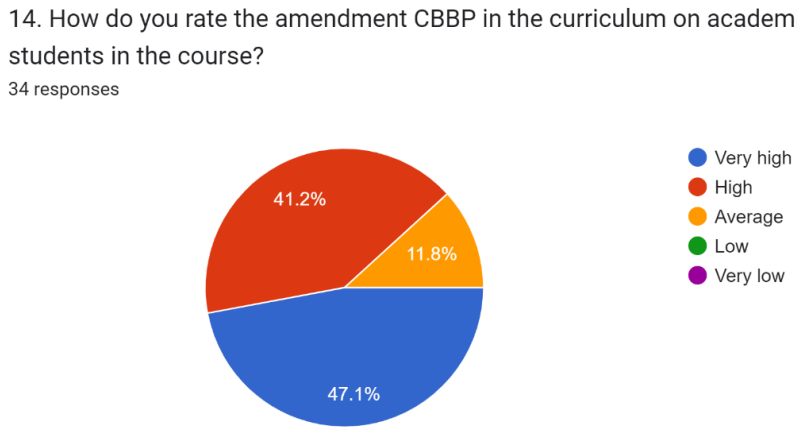

Figure 5. CBBP's integration into the curriculum in improving the academic achievements of students

The benefits that could be acquired by integrating CBBP into the curriculum include the introduction of new knowledge and approaches, encouraging staff to teach practical aspects of animal breeding courses, and using the CBBP villages as a learning field laboratory (Figure 6). The experience acquired from CBBP is also used to amend the curriculum with contemporary knowledge products to other disciplines (Figure 7). In order to

complement curriculum integration with training, ICARDA is offering short courses to university staff managing CBBP villages, and the training programs were found to be relevant and valuable, as perceived by 100% of respondents and beneficiaries of the training (Figure 8). The training is oftentimes offered in a ToT approach, reaches out to staff, students, and communities, and ensures a wider coverage of different stakeholders in the value chain. https://hdl.handle.net/10568/137171 and T Getachew, B Belay, B.A. Rischkowsky, A Haile - 2022 - cgspace.cgiar.org.

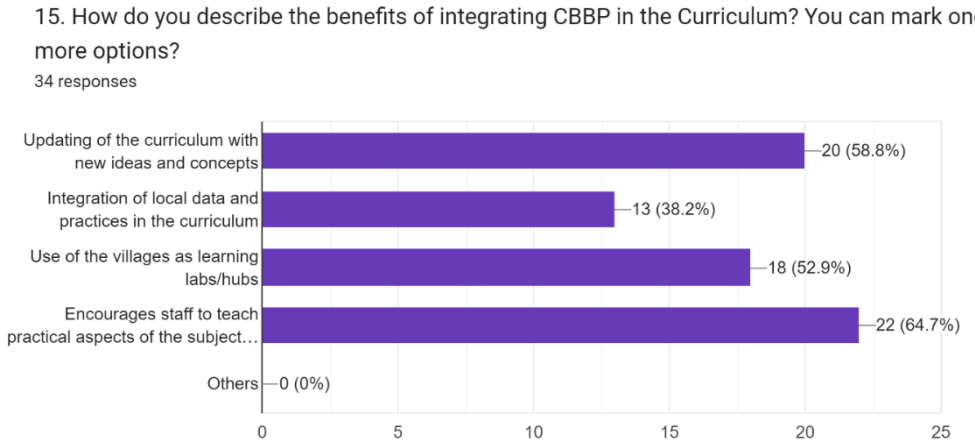

Figure 6. The benefits of integrating CBBP into the curriculum are noted.

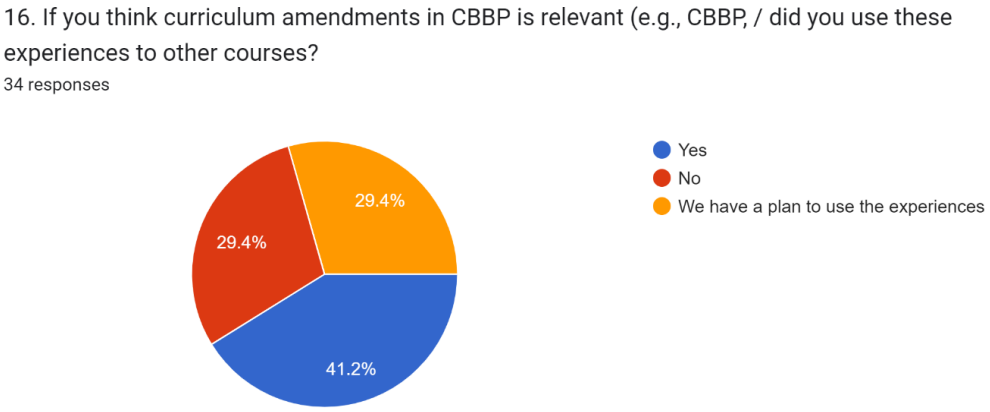

Figure 7. The transferring of the experiences of integrating gained from CBBP to other courses.

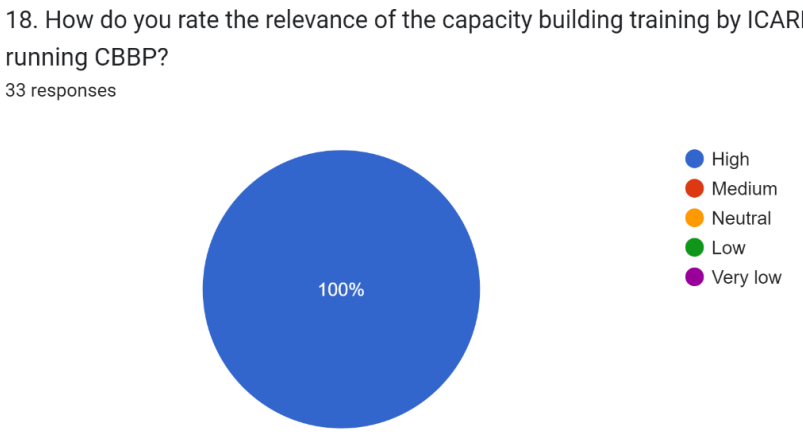

Figure 8. The relevance of the training offered to researchers on CBBP, as indicated by trainees

Next steps

- Cultivate the culture of amending curriculum with contemporary knowledge products and local data among universities to ensure its dynamic nature and support the future workforce in adapting to changing situations.
- Universities must sustainably strengthen CBBP villages to synergize community engagement, research/innovation, and learning and teaching. This will help create a model CBBP village that is within their proximity.
- Extend the experience of integrating CBBP to other universities in Ethiopia and other African Universities and link CBBP villages with research, community engagement, and learning.
- Expand the revamping of the curriculum from CBBP to SmartPack and ensure the inclusion of bundled innovations.
- Cultivate a culture of developing research design and longitudinal data archiving to enhance the integration of research and community engagement around universities
- Ensure the active role of universities in scaling and cluster initiatives and contribute to breed-level improvement initiatives.

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Berhanu Belay I Aynalem Haile I Mourad Rekik I Tesfaye Getachew I Barbara Rischkowsky - International Center for Agricultural Research in the Dry Areas

SAPLING Initiative Lead, Isabelle Baltenweck - I.Baltenweck@cgiar.org SAPLING Initiative Deputy Lead, Rekik Mourad - M.Rekik@cgiar.org

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