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Report on process followed in selection, procurement and dissemination of breeding rams and buck in community-based breeding programs in Ethiopia

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CGIAR is a global partnership that unites organizations engaged in research for a food-secure future. The CGIAR Research Program on Livestock provides research-based solutions to help smallholder farmers, pastoralists and agro-pastoralists transition to sustainable, resilient livelihoods and to productive enterprises that will help feed future generations. It aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world. The Program brings together five core partners: the International Livestock Research Institute (ILRI) with a mandate on livestock; the International Center for Tropical Agriculture (CIAT), which works on forages; the International Center for Research in the Dry Areas (ICARDA), which works on small ruminants and dryland systems; the Swedish University of Agricultural Sciences (SLU) with expertise particularly in animal health and genetics and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) which connects research into development and innovation and scaling processes.

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Background

Breeding programs described as community-based cover a range of situations but typically target low input systems with farmers within limited geographical boundaries having a common interest to work together for improvement of their genetic resources. Community-based breeding programs (CBBPs) focus on indigenous stock and consider farmers' needs, views, decisions and active participation, from inception through to implementation, and therefore provide a participatory and bottom-up approach. Ethiopian CBBP combines selection of breeding rams/bucks based on careful recording of important production parameters, such as body weight at 6 months and ewe/doe lambing/kidding interval, with expert local opinion as to what constitutes a good ram/buck and communal use of selected rams/bucks. Farmers who wish to participate are organized into sheep/goat breeding associations, many of which later evolve into formal cooperatives. Local enumerators are recruited to help in data collection, which is then managed in a data base and analyzed by scientists from local research centers to help to inform selection decisions.

In Ethiopia, the pilot CBBPs are designed and implemented since 2010 by a team of researchers from the International Center for Agricultural Research in the Dry Areas and International Livestock Research Institute, BOKU University, Austria and Ethiopian National Agricultural Research Centers. These programs were supported through various projects with financial support from different donors. The day-to-day follow-up of these programs was done by the research and extension departments of the Ethiopian government.

Recent evaluation of the pilot CBBPs in Ethiopia has clearly demonstrated that the schemes are technically feasible to implement and result in measurable genetic gains in economically important traits and improve the livelihood of the poor. Consequently, the Ethiopian Government has accepted CBBP as the strategy of choice for genetic improvement of small

ruminants as explicitly indicated in the Ethiopian Livestock Master Plan. The World Bank supported Ethiopian Livestock and Fisheries sector development projects has adopted CBBP and is upscaling CBBP in Ethiopia. The strategy of up scaling by the Government focuses on using the existing CBBPs as nucleus stock where genetic improvement is generated and improved genetics is disseminated to the base (production) population. ICARDA is asked to support the upscaling of CBBPs and this report highlights the process followed in selection, procurement and dissemination of improved genetics.

Selection of candidate rams/ bucks

Young rams/bucks are selected based on recorded data (own and maternal performance) for the set of agreed selection traits. Selection can be undertaken at different stages. For example, the first stage could involve culling of animals with undesirable phenotypic characteristics (e.g. tail type, coat color, horns, conformation, and general appearance) and clearly observable defects (e.g. small scrotum size, testicle deformation and undershot or overshot palates). The retained individuals are then further judged based on estimated breeding values for the selection traits. The stages at which the selection process takes place depend on both the existing traditional practices of ram/buck selection and use, as well as on scientific and practical requirements. If the selection decision can be made in line with the traditional practice, it will improve the probability of acceptance by the community.

It is important to cull undesirable males before they reach puberty (i.e. before they can serve). Depending on the species and breeds, this can be as early as 6–8 months of age. Where communal grazing is practiced, synchrony and agreement on when to cull is important as flocks can meet in common pastureland or watering points, when the undesired entire males can breed, and hence reduce the selection impact. It is also important that the selected young males are effectively used for breeding before they are sold off to avoid negative selection.

In all the CBBPs the best rams/bucks are identified by their breeding values computed from recorded data and based on their pedigree. Animal models is used to rank rams/bucks. In new

sites where breeding values cannot be computed because of lack of data, rams/bucks are selected based on simple index values that are computed from the available recorded data from the site population. The community is usually actively involved in the selection process so that the ram/buck ranking closely match their (own valuations) goals and desires as possible. This helps to build trust and confidence, buy-in, and a sense of belonging among the beneficiary community that increases both their confidence in the selected rams/bucks and ownership of the process.

To explain this with an example of Doyogena sheep, two stages of selection are applied: initial screening at the age when first sales of young rams occur (4–6 months) and final selection for admission for breeding at 12 months of age. All young rams are collected at one central place in each community on an agreed screening date. Selection is then carried out based on the data analyzed. A breeding ram selection committee composed of about 3–5 members elected by the community are involved in the selection. If for example 15 rams were to be selected from a total of 100 candidates, say 20 would be preselected based on their breeding value and the culling of the last five and the ranking of the selected rams would be made by the committee. The joint selection process strengthens the linkages between farmers, extension specialists and researchers.

In the selection, three groups are usually identified: top ranking, second group and third group. The top ranked rams are used within the community, the second group is sold as breeding sires to other locations and the third group (rejects for breeding) are castrated, fattened and sold as meat animals.

Procurement of rams/ bucks

For sustainability of CBBPs, support, particularly, during the initial stages of the breeding programs is important. Once candidate sires are selected, programs/projects need to buy and make the breeding sires available for the cooperatives. We have seen, through years that, fast growing animals are usually sold off, negative selection, where a scheme such as revolving fund

is not made available. Therefore, in all our CBBPs, we allocate fund for the initial purchase of young rams/bucks, which are communally used and when they are sold after service the fund is used to buy the second group of candidates, hence serving as revolving fund.

In most sites prices are set on weight bases, and on agreed data selected candidate rams/bucks are brought to a central place, weighed and the prices paid to the owners. The purchased sires are kept with the owners until they are distributed among the ram/buck groups for service. In conditions where prices are not set based on weight of the animal as Abergelle, prices are estimated by a committee set from the members of the cooperatives who are well informed about the market price. The suggested prices are then negotiated and mutual agreement is reached, also considering the added values of the bucks compared with the price for meat animals.

Dissemination of breeding rams and buck

There are three strategies to increase the availability of improved rams/ bucks: increase the number of CBBPs, increase the supply of improved rams/bucks per CBBP and increase the use of improved rams/bucks.

- Increasing the number of CBBPs requires additional project staff for recording and extension work, additional identification and weighing supplies, larger coordination and supervision efforts.
- Increasing the number of rams/bucks supplied per CBBP requires participating farmers to enhance reproduction, recording and maintaining a higher proportion of male progeny till final selection. The supply can also be increased reducing the requirements for a ram/buck to qualify for breeding. In the latter case this is achieved at the cost of a reduced selection differential.
- Increasing the use of improved rams/bucks through higher dissemination or through extending their use in time. Higher dissemination is possible through artificial insemination (AI).

Increasing the age of ram/buck disposal also leads to higher dissemination, although at the cost of an increased generation interval.

These avenues to reach a larger sheep/goat population with improved rams/bucks are not exclusive and should be considered jointly when planning different programs. In our upscaling effort, we use a combination of the three.

The number of breeding sires to be disseminated is dictated by the number that could be produced from the CBBPs, the resources available for purchase and the number of ewes/does available to be served. In either case, once the sires are procured and are ready for dissemination, a ram/ buck group is established in the receiving population. Ram/buck group implies households which live close to each other and are able to share the sires for breeding. The size of the group can also vary depending on the proximity and the number of stock kept by each household. The ram/buck groups are expected to manage and communally use the sires. After the intended use period, the sires are rotated among other sire groups. Usually, one sire serves around 20-30 ewes/does except in dry areas where breeding season is usually for a short period and hence more rams/bucks are needed over shorter period.

The rams/bucks are the property of the cooperative and therefore, once procured and sire groups are formed, they are transferred to association/ cooperative leaders so that the sires are commonly used.

Conclusion

The core in any breeding program is the identification of the best sires, procurement of them and dissemination of improved genetics. In our upscaling program, we select best sires using estimated breeding values, to ensure the best sires are not sold off and to make the scheme sustainable, the program/project buys the first group of sires and these are then communally used and sold to buy the next group of sires, hence serving as revolving fund. Dissemination of improved genetics is done through formation of sire groups in the base population.