CONSTRAINTS ASSOCIATED WITH THE IMPROVEMENT OF ANIMALS THROUGH BREEDING AS PERCIEVED BY POOR LIVESTOCK KEEPERS OF WEST AFRICA

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SUMMARY

The constraints associated with the improvement of animals through breeding, as perceived by poor livestock keepers in three West African countries (The Gambia, Senegal and Mali), were identified via a household questionnaire survey. The key constraints across countries were found to be 1) lack of capital to purchase good breeding animals; 2) lack of knowledge of breeding practices in general; and 3) high mortalities, especially in small ruminants. If within-breed genetic improvement programs are implemented as a livestock development intervention in West Africa these constraints will need to be addressed, in addition to other general constraints that have led to failure of breeding programs in developing countries in the past (such as lack of incentives, infrastructure, conducive polices and support services). Such interventions should initially be kept simple, low input and low risk but gradually evolve as the livestock sector develops.

INTRODUCTION

Endemic ruminant livestock (ERL) play an important role in the livelihoods of rural poor and can serve as a pathway out of poverty (McDermott *et al*. 2010). The ERL breeds of West Africa, notably N'dama cattle, Djallonke sheep, and West African Dwarf goat, are traditionally considered of low productivity compared to exotic breeds. They are however highly adapted to the local environmental conditions and are able to survive and remain productive with minimal inputs in tsetse infested areas, where other breeds succumb (Geerts *et al*. 2009). On this background, a project termed the "Sustainable Management of Globally Significant Endemic Ruminant Livestock in West Africa (PROGEBE, see http://www.progebe.net/)" was initiated with the aim of improving the livelihoods of ERL keepers in mainly mixed crop-livestock systems through a range of livestock related interventions. To better inform the design of project interventions and provide data for monitoring and evaluation purposes, a series of baseline surveys characterizing the livestock production systems of these ERL were performed. As part of this, data was collecting on a number of animal breeding issues, including constraints to breeding as perceived by the livestock keepers themselves. The aim of this paper is to describes these constraints, and discusses the implications of these in relation to establishing sustainable genetic improvement systems.

MATERIALS AND METHODS

The data presented here was collected from a household questionnaire survey performed in The Gambia, Senegal and Mali, at 3 sites per country (thus 9 in total). For each site, households were surveyed following a stratified (by village size) clustered random sampling design with a total of 238, 298, and 298 households surveyed in The Gambia, Senegal and Mali, respectively. For more information on the sampling strategy and full survey design see ILRI 2010a, 2010b and 2010c.

The survey questionnaires were completed in local languages by trained enumerators with, most commonly, the household head being interviewed. In relation to breeding constraint data, interviewees keeping livestock were asked: "What do you consider the main constraints to improvement of your animals through breeding?" separately for cattle, sheep and goats. Answers were recorded using a number of pre-set codes (see Table 1), which also included a category 'other' to allow for the specification of unforeseen constraints. Any number of constraints per

interviewee was allowed, with interviewees most commonly identifying between 1 and 4. It should be noted that though results are subjective and represent the perceptions of the interviewed livestock keepers (which are influenced by their experiences and knowledge, and additionally how the enumerators ask the question) such data can be extremely valuable in terms of an integrated approach to rural development.

RESULTS AND DISCUSSION

The percentage of livestock keepers identifying a particular breeding constraint is presented in Table 1. Note that the total number of respondents for each species / country combination varies and is lower than the total number of households surveyed, as interviewees only responded to species that they owned and there was a variable level of non-respondents.

Table 1. Percentage of livestock keepers, from The Gambia (G), Senegal (G) and Mali(M), identifying breeding constraints for cattle, sheep and goats.

Constraint	Cattle			Sheep			Goats		
	G	S	M	G	S	M	G	S	M
Lack of knowledge of the best breed / cross-breed to use	6.8	21.2	8.4	6.9	17.7	15.2	7.0	13.4	15.3
Lack of knowledge of how to identify good breeding animals	20.5	13.8	9.6	22.2	11.5	8.7	16.9	12.1	7.0
Lack of knowledge of breeding practices in general	26.0	52.0	19.3	27.8	52.1	28.3	25.4	54.1	13.9
Lack of capital to purchase good breeding animals	46.6	47.4	68.7	36.1	38.5	58.7	36.6	40.1	68.1
Lack of good animals of the ERL breeds to use	1.4	19.1	2.4	1.4	21.9	2.2	1.4	19.7	1.4
Lack of good animals of other breeds to purchase / use	2.7	4.6	2.4	2.8	8.3	4.3	0	5.1	1.4
Lack of information about animals that are for sale	1.4	2.0	1.2	1.4	2.1	2.2	1.4	1.9	1.4
Lack of breeding males for rent / use	1.4	3.3	7.2	0	6.3	2.2	2.8	7.0	2.8
Lack of AI services	0	0.7	0	0	0	0	0	0	0
Unable to control mating	0	15.8	1.2	0	13.5	2.2	0	17.2	1.4
High mortalities	23.3	13.2	2.4	43.1	20.8	2.2	40.8	21.7	5.6
Other constraint not listed above	11	3.9	1.2	8.3	1.0	2.2	7.0	1.9	1.4
Total number of respondents	*73*	*152*	*83*	*72*	*96*	*46*	*71*	*157*	*72*

Constraints of high importance.

Lack of capital. The most striking result is that 'lack of capital to purchase good breeding animals' was either the first or second ranked constraint for all of the country and species combinations. This means that any genetic improvement strategy would either need to be a low capital option (for example sire rental programs to alleviate inbreeding, or based around guidance on how to better select breeding animals from the livestock keepers' own herd / flock), or developed hand-in-hand with a credit scheme. Despite the fact that some credit schemes already exist in the surveyed sites, it should not uncritically be assumed that risk adverse poor livestock keepers would actually have sufficient incentive to take on loans to obtain genetically improved animals. This may especially be the case in relation to animals from within-breed improvement programs where significant gains are not realized in the short-term (as opposed to breed replacement programs where gains can be more immediate). An additional consideration is that

the primary objective of the poorest livestock keepers for keeping the ERL species is most often 'savings and insurance', with sale of the animals or their products for income a secondary objective, meaning that returns on investment in genetically improved animals could be hard to realize. It follows that caution should be taken before engaging poor livestock keepers in loans they may not be able to repay.

Lack of knowledge. The next most important constraint, after lack of capital, was 'lack of knowledge of breeding practices in general'. This constraint ranked either first, second, or third for all of the country / species combinations. In addition, two additional constraints around lack of knowledge ('which breed / cross-breed to use' and 'how to identify good breeding animals') were also important. This indicates the need for capacity building programs, targeted at the livestock keepers themselves, to build awareness of how breeding decisions can influence livestock productivity.

High mortalities. High mortalities were listed by the livestock keepers of Gambia and Senegal (though interestingly not Mali) as an important constraint for all species. Other results obtained as part of the baseline survey supported high mortalities being a constraint in all three countries, for all species but in particular the small ruminants (ILRI 2010a, 2010b, 2010c). Here annual instantaneous hazard rates of natural mortality (where natural mortality is defined as all deaths other than by slaughter) were estimated to range from 0.05 to 0.53 in The Gambia, from 0.03 to 0.15 in Senegal, and from 0.07 to 0.32 in Mali, depending on the species and age of the animals. The main reasons for mortality were identified as lack of feed or water, and diseases, with the importance of each constraint depending on the location and bio-physical conditions. It follows that interventions aimed at reducing mortality (such as improving access to feed and water, and the introduction of animal health-care systems) will be critical to the success of livestock improvement programs in West Africa, whether including a breeding program or not.

Other constraints. The constraint ranked lowest across all species/ country combinations was "Lack of artificial insemination (AI) services", despite variations in the availability of AI services across the surveyed sites. This fits with information from other components of the baseline survey which found the main source of breeding males to be from the household's own herd / flock, or used from the area for free (ILRI 2010a, 2010b and 2010c). Even where AI is available, there is very little incentive for poor livestock keepers to use it on the same breed, due to cost (Ahuya and Okeyo 2001) and the relatively marginal increase in productivity (in comparison to using AI for breed-upgrade, such as the crossing of indigenous to exotic breeds). A further constraint that ranked very low across all species / country combinations was 'Lack of information about animals that are for sale'. This relates to few animals specifically being purchased for breeding purposes as mentioned above, and likely because of a lack of knowledge of what information may be relevant.

Constraints of variable importance to the different species / country combinations were 'lack of good animals of the ERL breeds to use', 'lack of good animals from other breeds to use', 'lack of breeding males' and 'unable to control mating', and 'other' which on analysis was found to comprise numerous specific constraints.

Country specificity of constraints. The importance of constraints tended to be similar for all species within a particular country. This may be due to real country-specific issues or (and more likely) because of confounding of the enumerators with country. This confounding occurred due to the need to source enumerators that spoke the local languages (which differ by ethnic group),

and significant efforts had been made to reduced the effect of this confounding as much as possible via training. Given this, care has been taken to avoid over-interpretation of these results.

Implications. Within breed genetic improvement programs in developing countries have the long-term potential to improve the productivity of livestock and thus contribute to the improved livelihoods of the rural poor who keep them, as well as others along the value-chain. In Sub-Saharan Africa, however, there have been few such success stories. Reasons for this are varied and include the lack of proper targeting and involvement of the livestock keepers themselves in project design and implementation; lack of sustainability due to over-reliance on external (e.g. project) funding of limited duration; lack of impact due to the scale of operation and/or slow rates of genetic gain; lack of capacity, supporting institutions and policies; and failure to apply a systems approach (Kosgey and Okeyo 2007; Marshall *et al*. 2009; Rege *et al*. 2011). Breeding programs for ERL in West Africa will have to address these generic issues in order to achieve long term sustainable impact. This work, however, suggests the simultaneous need to prioritize interventions towards: 1) improving poor livestock keepers' access to affordable genetically improved breeding animals; 2) increasing the livestock keepers' knowledge of breeding practices; and 3) reducing the high mortalities of especially small ruminants. Such interventions should initially be kept simple, low input and low risk but gradually evolve as the livestock sector develops.

In addition to the above there are many other constraints associated with the West African ERL sector, such as depleting natural resources and access to markets (ILRI 2010a, 2010b, 2010c). Careful consideration thus needs to be given to the priority of within-breed improvement interventions in relation to other development investments. It could be argued that the recurrent failure of within-breed improvement programs within developing countries indicates a general lack-of-readiness for such an intervention, particularly for the less market-orientated livestock sectors.

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