15

Participatory Methods to Assess Traditional Breeding Systems:

The Case of Cattle Breeding in The Gambia

Professionals concerned with animal genetic resources (AnGR) management, trying to promote breeding initiatives, will typically be faced with a situation where no formal breeding system exists. No written records are available, breeding structures are absent, breeders are rarely organized, and no enabling policy environment is in place. To assume that this indicates complete absence of traditional breeding activities would be a serious mistake. Traditional livestock breeding activities are simply unknown to outsiders. The traditional breeding systems are often rather difficult to identify, because they are related to existing low input production systems and are not formally institutionalized.

A range of issues is being addressed as vital elements in the formulation of novel AnGR management strategies, dealing with technical, operational and policy needs.

- Methodological considerations emphasize participatory approaches for a better understanding of traditional breeding strategies and to achieve active involvement of the livestock keeping communities in breed improvement initiatives.
- Community-based management of AnGR is suggested as an approach that incorporates involvement and empowerment of the local communities who own and manage the indigenous animal breeds.
- Consideration is given to the inherent social dimensions of animal breeding activities.

For better AnGR management and continued use of local animal breeds, appropriate methodologies that enable outsiders to better understand traditional breeding systems are required. A comprehensive investigation that seeks to understand traditional breeding strategies and emphasizes the existing local knowledge base is an approach that builds on cooperation with livestock owners and other stakeholders. This includes facilitation of communication between professionals in research and development (R&D) and the livestock-owning communities promoting the involvement of livestock owners. Simultaneously, the data requirements of formal breed improvement programs can find consideration.

Trypanotolerant Livestock of West Africa: The N'Dama Cattle

Despite severe ecological constraints, foremost is the presence of trypanosomosis, a parasite transmitted through livestock diseases endemic in the humid and sub-humid zones of West Africa, agro-pastoralists have succeeded in establishing sustainable production systems in which livestock is of vital importance. The exploitation of these production systems is possible due to the ability of some of their livestock species and breeds to survive, reproduce and remain productive under trypanosome risk. This unique characteristic called trypanotolerance, was recognized and

exploited by livestock farmers long before national and international institutions began scientific research on mechanisms of trypanotolerance.

Trypanotolerance in cattle is now well documented, particularly in the N'Dama, the most numerous trypanotolerant cattle breed in West Africa. In addition to the resistance to trypanosomes, trypanotolerant N'Dama cattle are also reported to be resistant to several other important diseases, such as a range of tick-borne infections. While initially perceived as less productive due to their small size, N'Dama cattle were found to be equally, if not superior, in their productivity, when compared to other local trypanosusceptible breeds maintained under similar, but trypanosome free production systems.

A Participatory Approach for Better Understanding of Traditional Breeding Systems

To assess the traditional cattle breeding systems in The Gambia, a sequence of survey steps was employed. This sequential procedure served primarily three reasons:

1. Many occasions for group discussions were created to facilitate informal exchange of breeding knowledge and experience between livestock owners and scientists.
2. Livestock owners could be informed about intermediate results obtained from consecutive survey rounds.
3. The feedback that scientists received during discussions with livestock owners was utilized in refining the following survey steps.

The study was conducted among herd owners and herders of 27 villages in three districts in The Gambia. Throughout the country, a traditional low-input mixed crop-livestock system prevails. Cattle are used as a multi-purpose breed providing milk, meat, manure and traction. About 95% of the Gambian cattle population consists of the N'Dama cattle breed.

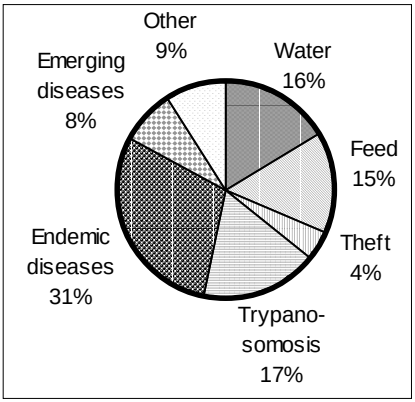
Information Obtained in Sequential Survey Steps

- Focus group discussions in seven villages served as an explorative tool to find out about agro-pastoralists' breeding strategies, including breed and trait preferences and breeding practices.
- A baseline survey among a large number of herders and herd owners provided quantitative information on aspects such as: production systems, herd management, cattle production constraints and possibilities, cattle breeds present and criteria used to characterize the N'Dama breed.
- Matrix rating of cattle types accompanied by a questionnaire to generate information on breeding practices, cattle production objectives and factors hypothesized to determine breed preferences was carried out among herd owners.
- The role of local institutions and organizations in cattle breeding was assessed, using a practical action-oriented approach for local institution analysis combined with an institution diagramming technique.

The Production System

To understand and evaluate livestock owners' breeding strategies, it is necessary to have sufficient information about the production system, livestock production constraints and production possibilities as well as production objectives.

In The Gambia, the majority of agro-pastoralists find livestock and crop-farming equally important undertakings of the farm-household. This underlines the high level of crop-livestock integration found among cattle owning households. Cattle have primarily a savings function. Milk production is important, but so are manure and traction power.



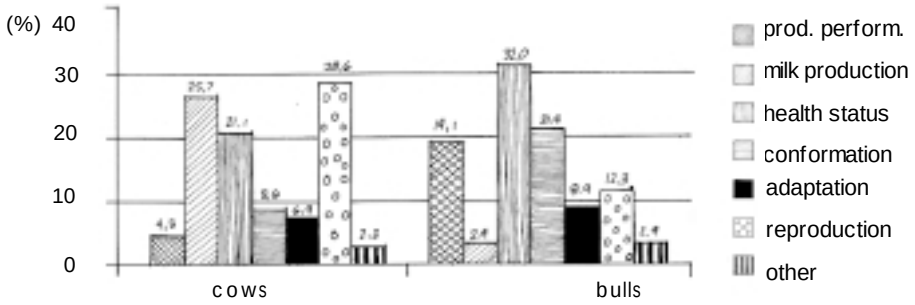
Production Constraints in Cattle Keeping

Cattle diseases are perceived as the most serious production constraint. More than half of all agro-pastoralists identify emerging or endemic disease and specifically trypanosomosis as important production constraints. Second to disease range insufficient availability of water and feed (grazing), particularly during the dry season.

Criteria Used to Characterize the N'Dama Breed

Agro-pastoralists were asked to describe all criteria that they use to evaluate the N'Dama cattle. Frequencies of the collected criteria indicate importance of traits in terms of their priority for agro-pastoralists (CIRDES/ILRI/ITC 2000). Most frequently mentioned evaluation criteria for N'Dama bulls were size, 'strength', libido and 'good offspring'. The term 'strength', as explained by agro-pastoralists, describes a combination of vigor and fitness. In N'Dama cows, milk production, yearly calving and 'strength' were priority criteria. All criteria were grouped into parameters to identify and quantify the importance of functional and production traits depicted below. Health status, reflecting disease resistance, was the most important parameter in bulls and very important in cows. Production traits of high priority were milk and reproduction for cows and conformation (size) and production performance for bulls.

Parameters Used to Characterize N'Dama Cows and N'Dama Bulls



Cattle Breeding Practices

Breeding goal and breeding practices are two key aspects of the traditional breeding systems that need to be well understood. Breeding practices, such as for example the mating system, the selection and availability of breeding males or keeping pedigree information determine whether the expressed breeding goals can be achieved. The minimum information to describe breeding practices includes herd size and herd structure, the number of breeding bulls available per herd, and how mating is organized/controlled.
In The Gambia, mating is predominately controlled by herding, unselected males are usually castrated or sold before maturity. Herd owners responsible for the herd management are usually able to detect cows in heat. In the majority of herds, one or two breeding bulls are present and the lack of a breeding bull is perceived a significant production constraint.

The Matrix Rating Technique

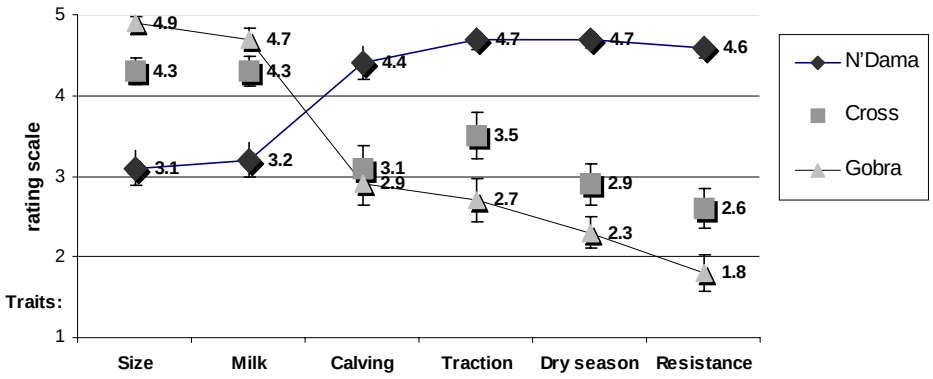
Matrix rating is a well-established analytical tool in R&D and lately used to investigate breed preferences. It produces quantifiable data for the evaluation of different breeds and/or traits utilizing the local knowledge of the livestock keeping communities.

Cattle owners were asked to compare the local N'Dama breed, the Senegalese zebu-type Gobra breed and their cross-bred, commonly called Macha or Djokeré. Each breed was evaluated by ranking it for six predefined traits. These traits were animal size, milk yield, calving frequency, traction ability, ability to cope with hunger stress and disease resistance and were chosen based on previous study outcomes.

One to five shells could be placed in each cell of the matrix, where on the horizontal axis the cattle breeds were illustrated and on a vertical axis photographs symbolized the traits. Descriptive statistics was based on commonly-available software packages.

The diagram below depicts the matrix rating results. In comparison to the zebu-type Gobra, the N'Dama received far higher ratings for its adaptation to dry season stress, disease resistance and traction ability. The zebu-type Gobra, on the other hand, received lowest ratings for disease resistance and ability to cope with dry season stress, but was highly valued for its size and milk yield.

Average Matrix Rating Results of Three Cattle Types Over Six Traits



Cattle owners also expressed their general preference for the N'Dama breed and clearly established the important role of the N'Dama as a multi-purpose animal within the farm-household. Nevertheless, animal size and milk yield also mattered and were ranked as criteria of high priority in the selection of breeding stock. A preference conflict became apparent, which cattle owners had to solve. It was then not surprising that cross-breeding of N'Dama and Gobra cattle was found among the options in traditional breeding strategies.

Institution Analysis

Taking into consideration that animal breeding activities have an important social dimension and depend by their nature to a large extent on structural and human capacities to coordinate and interact, an assessment and evaluation of the role of local institutions and organizations in livestock breeding was carried out at the community level. A practical, action-oriented approach for the analysis of local institutions in combination with the participatory technique of institution diagramming was utilized.

Cattle owners described the relative importance of institutions, their functions and the degree of interaction among individuals, the community and the institutions and organizations relevant to their cattle enterprise. The analytical process was assisted through visualization by depicting the institutions, organizations and their linkages in diagrams.

The institution diagramming revealed that herd owners face difficulties to obtain good quality breeding stock. High risks were associated with the purchase from animal traders, because loss due to disease wss frequent. Competition among herd owners was identified as a problem. Information was usually not shared and breeding knowledge only passed on within the larger families. The organizational level of cattle owners was relatively weak and few traditional institutions were perceived to function well.

Conclusion

The use of participatory survey techniques, as part of an appropriate methodology to assess traditional breeding systems, was found to be very useful in gaining better insights into the prevailing production systems and the related breeding strategies. It was vital in promoting the involvement of the livestock-owning communities in AnGR management activities.

The consideration of the existing local knowledge base and traditional breeding practices for better AnGR management and continued use of local animal breeds could not be overemphasized. Where the aim is to support and strengthen local breeding endeavors, participatory techniques can be successfully combined with the collection of quantitative data necessary for more formal breeding approaches.

It was demonstrated that in traditional livestock systems, very rational breeding strategies are defined and implemented. Local breeders realize clearly-defined breeding objectives (the need for adaptation and disease resistance) reflected in preference for the local N'Dama and selection for such traits.

Two essential outcomes of the study have been the information that a considerable demand for certified quality male breeding stock exists in the project area and that additional resources will have to be invested in strengthening local institutions and breeders' associations.

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