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Management of Animal Genetic Diversity at Community Level

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Eschborn, August 2000

Managing Agrobiodiversity in Rural Areas
gtz

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April 2000

SUMMARY

Domestic animal diversity in developing countries is embedded in traditional farming and pastoral communities who manage their livestock according to their indigenous knowledge (IK) and in tune with local ecological constraints. Especially in marginal environments, local livestock breeds are crucial for sustaining rural livelihoods by producing a wide range of products while requiring relatively low levels of input with regard to fodder, management and health care. Thus their maintenance is ecologically more sustainable and they entail a lower work load for women in comparison with improved breeds. However, economic forces of globalization as well as political backing for crossbreeding with exotic breeds, among other factors, have already resulted in the disappearance of a large number of these breeds and many more are threatened.

Maintenance of the remaining livestock genetic diversity as mandated by the Convention on Biological Diversity (CBD) requires a wide range of general policy changes as well as specific initiatives. Activities that can be carried out within the framework of technical cooperation include, at grassroots level, support for research into IK and NGO capacity building and, at the national level, a reorientation from crossbreeding with exotic breeds to the development of local breeds by selection, the training of relevant agencies in participatory techniques, consideration of local livestock in land use and regional development planning, as well as the creation of a positive marketing environment. At an international level, a scrutiny of subsidies and support for crossbreeding is called for and intellectual property protection must be extended to farming and pastoral societies that have created unique breeds.

INTRODUCTION

”While agricultural diversity cannot be saved without the farming community, the farming community also cannot be saved without agricultural diversity.” (RAFI)

The Convention on Biological Diversity (CBD) calls for the conservation of biodiversity in the surroundings in which it developed. In the case of livestock, ”surroundings” would refer to the multitude of farming and pastoral communities that have nurtured most of the existing domestic animal diversity and developed the approx. 4000 recognized livestock and poultry breeds out of a small number of domesticated species.

Box 1:
Domesticated animal diversity is composed of diversity at the species and breed level.

At the **species** level, there are just over 40 species that are used for agriculture, with 90% of the products contributed by only 14 species.

These domesticated species have been diversified by human manipulation into an estimated 4000 **breeds.** The term ”breed” is difficult to define, but most often understood as ”a group of domestic livestock with definable and identifiable external characteristics that distinguish it from other groups within the same species.”

Community-based management of animal genetic resources (AnGR) represents a distinct form of in-situ conservation that has advantages over in-situ conservation ”on-station”, in zoos or parks, in various ways. For one, indigenous breeds are products of specific ecological and cultural environments, and their genetic make-up and integrity will be affected if they are removed from their original contexts. Transfer of domestic animal populations into the controlled environments of government farms poses the danger of a gradual erosion of their adaptive traits. Secondly, livestock breeds are not static entities but are continuously being shaped and adapted in order to respond to changing ecological and economic conditions. There is a consensus that, contrary to plant genetic resources, AnGR can only be conserved through utilization. Their ”conservation” therefore requires the active support of the farmers who own and utilise these animals. From the global perspective of maintaining livestock genetic diversity for preserving certain genetic traits, there is thus a strong rationale for ”community-based” versus ”on-station” conservation of livestock breeds.

But in the context of development cooperation, a more urgent rationale for community-based conservation is probably represented by what has been coined the ”people-centred” perspective: This is

the realization that local types of livestock (breeds as well as species) continue to form the basis of the livelihood, as well as the cultural identity, of many farming and pastoral groups. There are many cases where the substitution of native breeds through high-input-dependent exotic breeds or their dilution through crossbreeding has rendered communities dependent on outside supplies and subsidies, as well as vulnerable to ecological calamities. Once the inputs stop or the economic scenario changes, keeping "improved" animals is no longer technically feasible and economically viable. If the traditional stock has become extinct in the meantime, people are worse off than before.

While the need for conservation of livestock genetic resources at community level is undisputed, related projects have been rarely, if ever, undertaken in the context of development cooperation. Earlier approaches to livestock development, with their one-sided emphasis on raising productivity, often undermined the ability of communities to manage their livestock genetic resources by promoting exotic breeds (through replacement and crossbreeding). The shift to people-oriented development that started in the 1990s led to projects which did not explicitly address domestic animal diversity, but at least they did not undermine it. Some of them, by being directed towards supporting pastoral livelihoods, may even have contributed to maintaining or conserving breeds.

1. BACKGROUND INFORMATION

1.1 Traditional community-based management of AnGR

"It is the combination of rural peoples' knowledge of their environment and the way that they manage their livestock that maintains domestic animal diversity, not just the keeping of animals per se." (ITDG, 1996).

The livestock genetic diversity encountered in developing countries is the product of local environmental conditions combined with the breeding strategies of traditional communities. Intraspecies biodiversity (the differentiation of a livestock species into many different "breeds") is the outcome of many different communities[1] managing livestock in many different habitats and ecological niches, and manipulating its genetic composition according to the specific requirements of their environment, their production system and their own preferences or breeding goals. There is still a widespread belief among animals scientists that livestock in developing countries has been shaped only by the environment and not by human intervention. However, recent summaries of indigenous knowledge (IK) related to animal breeding ("***indigenous animal genetic resource management")*** refute this analysis. Some aspects of how pastoral and mixed farming communities manage their animal genetic resources will be enumerated here:

1.1.1. Breeding goals of traditional societies are far more multifaceted than in intensive productions systems and comprise many aspects other than high productivity with regard to cash products (meat, milk). They can include aesthetic preferences (preferred colour and colour distribution), religious requirements and behavioural aspects, such as a complacent nature, good mothering instincts, herdability, the ability to walk long distances and loyalty to the owner. One aspect of overriding importance is to avoid risks - the ability of livestock to survive natural calamities (droughts, climatic extremes) is necessarily more important than high productivity.

1.1.2. Breeding practices

Traditional livestock breeders have developed a large variety of institutions and mechanisms for optimizing the genetic quality of their animals within the constraints of their environment.

Social restrictions against selling female breeding stock outside the community

Many pastoral societies have instituted restrictions, even taboos, on selling female breeding stock to somebody outside the community (i.e. tribe or caste), because they consider it their "capital". This attitude can be observed among practically all camel pastoralists. But it can also pertain to other animals. For instance the Raika pastoral community in Rajasthan has issued caste regulations that no female sheep should be given to anybody outside the community.

[1]With respect to livestock it makes more sense to define the term "community" as referring to a social or ethnic group rather than a village.

Stock exchange.

On the other hand, exchange of animals between members of the same community in the form of stock loans and alliances is usually encouraged and this can serve to bring in fresh blood or upgrade stock. In Lesotho and Western Zambia ***mafisa*** is practised, which entails placement of a family's cow in a herd with a superior bull. The cow returns home with its improved progeny after several years; in the meantime the host family can utilize the additional milk. Thus, in many pastoral societies, there is communal access to privately owned animals.

Selection

Most selection efforts focus on male animals, which are usually chosen on the basis of their female relatives' performance, their strength and vitality, as well as their phenotypical characteristics. Pastoralists, such as the Baggara in Sudan, reject cows that do not accept their calves.

Offspring testing

Camel breeders, including the Somali and the Indian Raika, initially mate male animals only with a limited number of females. Only if the first crop of offspring has the desired qualities with regard to vigour and looks, is the sire used more widely for breeding.

Communal ownership of male breeding animals

Male breeding animals are also often regarded more as common than as private property. In Rajasthan, the village bull is traditionally selected and maintained by the community as a whole. Villagers pool their resources to purchase a bull from a reputed breeder, share the upkeep by providing a fixed amount of grain and green fodder per household, employ a keeper, and make a joint decision on when and how to dispose of the animal (usually after three to four years) to avoid inbreeding.

Among Raika camel breeders, there is an obligation for the proprietor of a good quality male camel to share its services with owners of other female camels. It is virtually impossible to turn down requests from other members of the community, even if it means that the male will be overburdened.

Avoidance of inbreeding

Some groups fastidiously avoid inbreeding, others see no harm in it. Often the attitude mirrors marriage practices. For instance, Arabian Bedouin are an endogamous society who do not prevent inbreeding, while pastoralists in Rajasthan, where exogamy is practised, never allow it.

Castration

Castrating male animals not suitable for breeding is an important mechanism for maintaining or improving desired qualities. The superior quality of the livestock in the Marwar region of Rajasthan has been attributed to the fact that all male cattle not desired for breeding were castrated. However, the practice hinged on the availability of people to perform this socially debasing task. Nowadays, the members of the Satya caste, who traditionally carried out this job, are no longer willing to do this work, with serious consequences for the quality of cattle. However, there also some examples of cultures (for instance in Madagascar) in which the strongest animals are castrated for fattening, thus resulting in negative selection.

BOX 2: Role of Pastoral Communities in Conserving Domestic Animal Diversity

Due to their higher dependence on animals, pastoralists have been especially successful at developing **breeding practices** that serve to protect and enhance their resource base. Their breeds are often considered superior by farmers. Pastoralists raise animals under conditions close to those obtaining in the wild; therefore the breeds kept by them are most likely to retain those traits that are of greatest interest from the "genetic resource angle".

Because pastoralists often feel responsible for the fate and welfare of their animals, they would seem to be predisposed for a crucial role in the conservation of domestic animal diversity.

Pedigree keeping

Many pastoral and agro-pastoral communities keep detailed mental records of their animals' ancestry, reportedly up to seven generations back. Usually animals are conceptualized as offspring of female bloodlines.

Maintaining adaptation

When Fulani migrate into new areas, they make a point of buying local bulls and rams to maintain their herds' adaptation to local diseases.

BOX 3: Traditional Institutions: Gaushala

An example of a traditional institution for maintaining genetic diversity is furnished by the "gaushala" (literally cow shelter) that is ubiquitous in many parts of India. Although they are often ridiculed in the west as religiously motivated, they generally fulfil an important buffer function by admitting and feeding cattle through times of stress/drought and dispersing them back to the community afterwards. Gaushalas are regarded as serious partners in the conservation of local livestock breeds by the Department of Animal Husbandry of the Government of Rajasthan in India.

1.1.3. Local concepts about breeds

Scientific breed classification systems usually do not take into account indigenous perceptions and do not correspond to local terminologies. In India, for example, they are based on data collated during colonial times and only now are undergoing some revision. Although farmers and pastoralists are not aware of scientific breed concepts, they often make very elaborate distinctions, leading to a local classification system that can be more refined than the official one. For instance, according to scientific opinion, there is only one donkey breed in India. Local people, however, distinguish at least three types that are phenotypically quite distinct and also originate from different regions. In all probability they would therefore represent different breeds by scientific standards also. Similarly, scientists had overlooked a local Indian camel breed that had long been known to pastoralists for its good milk yields and even been used by them for upgrading other breeds. It is very likely that by incorporating indigenous knowledge into scientific documentation efforts, the list of recognized breeds or strains will expand significantly.

The status, and even identity, of many indigenous breeds remains confused. For instance, the Tharparkar cattle, a breed with potential for good milk yields under the arid conditions of Rajasthan, is often deemed as "threatened", but estimates of the current population size vary dramatically. Some experts regard the entire cattle population of the two districts where it occurs as "Tharparkar", which would amount to several tens of thousands. Others say that only the 200 or so cattle kept on the state breeding farms can be considered as "Tharparkar". For local people, on the other hand, the term "Tharparkar" is meaningless - they refer to it as "Sindhan". The absence of a common terminology and common concepts represents a formidable obstacle in the documentation of domestic animal diversity.

Efforts to characterize breeds have focused on their phenotypic and production characteristics. But in addition to considering physiological and behavioural aspects, it would also be important to document local name(s) and local concepts about them, as well as the social dimensions, i.e. knowledge about the institutions and breeding goals that have shaped them.

1.2 Processes undermining community-based management of AnGR

Various processes have been identified as impairing the ability of communities to maintain their traditional breeds and contributing to the erosion of domestic animal diversity. Among them are:

Promotion of exotic breeds and crossbreeding

There are numerous instances where the promotion of exotic breeds has led to the virtual extinction of local livestock resources. Two recently documented examples include the Nguni cattle in South Africa and the Criollo pig in Mexico. In these cases, farmers were encouraged to switch to more productive "improved" breeds, however these turned out to be economically unviable once the macroeconomic situation changed and outside inputs stopped. Meanwhile, the local breeds had almost disappeared, and there are now efforts to resupply them to farmers. The popular practice of upgrading local breeds by crossbreeding with exotic breeds has also frequently resulted in virtual elimination of local breeds.

Loss of the resource base

This circumstance concerns mostly breeds and species kept by pastoralists. When alienation of common grazing grounds forces pastoralists out of business, the breeds that have co-evolved with them also disappear.

Lack of market demand

Because of economic shifts, animals can lose their market value. This has for instance happened with several of the Indian cattle breeds used for draught, such as the Nagauri and the Tharparkar cattle.

Loss of indigenous knowledge and institutions

Once a breed becomes uneconomic, either through lack of a resource base or through lack of demand for its products, then a secondary development is the disintegration of the traditional institutions that were associated with it. As an example, in Rajasthan, the practice of keeping a village bull has disintegrated in areas where cattle breeding is no longer profitable and cattle are kept only because of their religious significance.

Political conflicts

Warfare can directly and indirectly cause the disappearance of breeds, owing to extermination in the conflict area or by being forced to move into different areas where mixing with other breeds occurs.

Natural disasters

Droughts, cyclones and floods, such as recently in Orissa, India, can lead to the extinction of breed populations.

BOX 4: Reasons for the disappearance of the Tharparkar breed

A rapid rural appraisal session with farmers revealed the following reasons for disappearance of the Tharparkar breed:

- After partition, most purebred animals ended up on the Pakistani side of the border. Formerly, cattle breeders had undertaken seasonal migrations, but this has become impossible.
- Some time later, milk sellers from Jodhpur purchased a large number of the remaining high-quality animals.
- The Tharparkar breeding area has become infiltrated with cattle belonging to other breeds (Kankrej in the south and Rathi in the north), in search of pasture. This has led to unintentional crossbreeding and dilution.
- The pasture base - Sewan grass that used to be abundant - has become degraded, partly due to the influx of animals from other areas.
- Since there is no longer a demand for the male animals as draught bullocks, nor can they legally be sold for meat, people have also lost interest in breeding these animals.

2. COMMUNITY-BASED APPROACHES TO MAINTAINING LIVESTOCK GENETIC DIVERSITY

2.1 Community-based conservation of livestock breeds

There are so far hardly, if any, projects in developing countries in which communities have actively participated in conserving livestock breeds already regarded as threatened. One example in which the participation of local people was sought concerns the Jamnapuri goat in India, where the documentation efforts of the Central Goat Research Institute were welcomed by farmers. Another example are conservation efforts by a religious trust for Haryana and Sahiwal cattle in India, and the third case pertains to attempts by cattle keepers in Botswana to stick to their traditional cattle breed rather than adopting improved types.

An example of ”state-driven” community involvement is furnished by the conservation efforts of the Chinese government for the Hu-sheep. The remainder of the purebred Hu-sheep population has been placed into the hands of farmers, who are not allowed to sell, slaughter or exchange any of the animals without official permission, although they are compensated with a subsidy. In the core area of the project the keeping of any other type of sheep is not allowed. A herd book is kept and the lowest performing individuals are eliminated. Unfortunately, there is little demand for the products of this breed, so the chances of the conservation effort succeeding are not regarded as good .

The term ”**community-driven conservation"** is advanced in a research proposal concerning the Vietnamese i-pig. Since pig husbandry is economically extremely important in Vietnam, efforts were made to upgrade the productivity of local breeds by crossbreeding with exotic pigs. Now the danger to the indigenous pig breeds - which have many advantages - has been realized and the National Institute of Animal Husbandry is attempting to save the most threatened breed, the i-pig, by giving purebred specimens to farmers. The goal of the project is to evaluate the farmers' perceptions, their acceptance of the programme and comparative economic benefits of keeping local breeds of pigs. The possibility of extending the approach to other breeds, such as the Mong Cai and Meo, will also be examined.

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2.2 Requirements for community-based conservation

Given the constraints encountered in developing countries, the essential requirements for the maintenance of a breed or species in a community context are an economic niche, i.e. a demand for the product(s) of the breed concerned and a sufficient pasture and/or fodder base. In order to guarantee this, appropriate policy support is required. Only if these criteria are fulfilled can technical and organizational inputs from outside agencies further increase a breed's chances of survival.

1. Stimulation of niche markets

There are several examples, including some from developing country contexts, where the stimulation of a demand for specialty products has contributed to the survival of a breed.

Special fibres for the handicraft market

In Brazil, the Criollo Lanado sheep produces naturally coloured wool for which the industry pays a very low price. But when peasants were trained in spinning and weaving this type of wool, the demand for it increased and consequently also the number of herds.

In the southwest of the USA, the Navajo-Churro sheep was at the brink of extinction in the 1970s, and native American weavers had started to use imported wool from Karakul sheep. A concerted effort rescued the few remaining sheep by selecting them on the basis of traditional breed characteristics and increasing their numbers. There is now an active breeders' organization and the Navajo-Churro sheep once again provide fleece for native American weavings and are part of native culture.

Specialty food products

Products of local breeds often have qualities that distinguish them positively from the generic products.

The population of the northern Italian Reggiano cattle, whose milk is used for making Parmesan cheese, had dwindled and only a few hundred animals were left. The breeders formed a consortium and decreed that only cheese made from the Reggiano cattle's milk may be called Parmesan. As a consequence, their economic situation improved and the number of Reggiano cattle has increased significantly.

Similarly, in Rajasthan, the milk of local cattle breeds has a higher fat content and is regarded by local people as much tastier and more nutritious than that of crossbred cows. Marketing it under a separate brand label could well stimulate demand for it.

Ecotourism

The Gujjars in Uttar Pradesh keep a special type of buffalo in a transhumant system, migrating up the Himalayas in the summer. When their home range was declared a national park, the Gujjars and their buffalo were initially evicted. After they fought the decision, a joint forest management plan was established, and now the buffalo supply milk to thousands of tourists and pilgrims. Without the availability of milk directly from producers, the amount of garbage from packets and tins would probably be considerably greater.

In Nepal, the survival of the Baruwal sheep and the Sinhal goats depends on the survival of the traditional transhumant production system. It has been suggested that combining the migratory system of raising sheep and goats with ecotourism in the alpine areas is an approach with a promising future. In this area, sheep have traditionally been used for carrying loads.

2. Resource and fodder base

Even a strong demand for the products of a certain breed or species is not sufficient to maintain it if a sufficient fodder resource base is not available and the feeding problem cannot be solved.

3. Policy and institutional support

Conservation and development of local breeds need to be backed up by political support guaranteeing access to pastures and by institutional support for experimenting with the processing and value-addition of the products as well as creating the right marketing environment.

BOX 6: Need for policy changes to maintain pasture base

The camel is an important component of Rajasthan's agrobiodiversity and cultural heritage. Although it is still a crucial source of draught power for the poorer sections of the rural community, the camel population is dwindling rapidly. Lokhit Pashu-Palak Sansthan, an NGO, has undertaken action research into the underlying causes. It has found that camel breeders are increasingly opting out of the business, although prices are high and going up every time the diesel prices are raised. At the root of the problem is the alienation of the traditional grazing areas which makes it impossible to raise camels, despite strong demand. Impaired nutritional status has increased disease incidence and the rate of abortion, which further decreases the already low reproductive rate of camels. Although the provision of health care and access to good quality male breeding camels has stabilized camel numbers in the immediate project area, policy changes, such as reservation of grazing areas, are required if the camel population is to be saved.

2.3 Community-based development of local breeds

It was long held by animal scientists that genetic improvement of livestock populations by means of selection within the breed was a very slow process and not really worthwhile. However, there is now increasing evidence that the productivity of local breeds can also be improved within reasonable time frames. The most famous example concerns the various zebu cattle breeds (including Ongole, Gir, Kankrej) that were exported from India to Brazil, Australia and other countries earlier this century. In their new homes they have been improved on genetically and come to represent prime beef or dual-purpose producers, whereas the Indian zebu populations have decreased in number, become diluted due to crossbreeding and in some cases are regarded as threatened. Some private initiatives in India, such as that by the Gir cattle breeding farm of the Shri Bhuvaneshwari Pith in Gujarat, show that considerable improvements in milk production can also be achieved.

Experiences with helping **communities** to "develop", i.e. genetically improve existing indigenous animal populations, are limited so far, although there appear to have been some successes with very quickly reproducing animals, such as guinea pigs and ducks. Outside inputs include both technological and organizational support.

Community or village breeding programmes

Carried out by smallholder communities, this is a new concept that is emerging from Latin America. Their primary objective is increasing economic returns from indigenous types of livestock through a combination of genetic improvement by selection, organization of breeders, and improvement of market linkages. In South America there are state-sponsored programmes for native (alpaca, llama) and imported small ruminants (goats, sheep), but these are still in their infancy. Another attempt in this direction, to increase economic returns from the Fulani cow by means of recording, selection, improved fodder supply and development of milk marketing is being undertaken by the NGO APESS in Burkina Faso.

Breeding associations

Organisation of breeders into cooperatives or associations is regarded as an important step for community-based breed development. In Peru and Bolivia, alpaca producers have formed associations. Breeding associations have proven extraordinarily effective in industrialised countries and in some developing nations, such as Brazil. Support for breeders associations (record keeping, etc.) proved to be one of the best ways of increasing interest in local breeds in Brazil.

Breeding programmes

Breeding programmes have been successful for guinea pigs, after initial problems. For the alpaca, the adoption of breeding plans has helped to eliminate coloured individual animals for whose fibre there was no demand. The main lesson that seems to have been learnt is that breeding objectives must be defined in close cooperation with the farmers.

Open nucleus breeding schemes are seen as a viable option for developing local breeds, but they may not easily be accepted. If the breeding population is very small, outside help might be needed to prevent inbreeding.

Record keeping

Record keeping and performance recording were an important element of breed improvement in the west. Nevertheless, motivating breeders to keep records of individual animal performance can be difficult, and such approaches seem to work only in contexts where there is a certain level of literacy among breeders. However, in much of the developing world, and especially in pastoral contexts, breeders are illiterate, which calls for specialized communication strategies and development of appropriate recording techniques. Wider adoption of participatory techniques among veterinarians and other professionals working with livestock keepers would seem to be a prerequisite.

Animal competitions

Competitions and the honouring of individual breeders at national fora has been suggested as a means of generating interest in local livestock. Care must be taken that judgement is made according to local criteria and not to outside ones. At the Pushkar camel market in Rajasthan, livestock competitions are a regular feature arranged by the Department of Animal Husbandry. However, the response is not good and there are frequent disputes, since breeders' ideas of what constitutes a good animal differ from those of government officials.

It is worth noting that the concept of participatory plant breeding is not yet matched by an analogous form of **participatory animal breeding**. The one exception, in which background research on how traditional communities manage their AnGR led to a breeding programme, concerns the work of the University of Chiapas on the Chiapas sheep. In this project, the indigenous knowledge of the Tzotzil shepherdesses about the qualities of their sheep was actively solicited and formed the foundation of a breed improvement programme.

2.4 Breed conservation as a component of regional development and habitat conservation

In Europe there are a several examples of where local animal breeds are an integral part of conservation efforts for certain ecosystems, such as the Camargue in France and the Hortobagy National Park in Hungary. Similar scope would seem to exist in the developing world, where wildlife protection and livestock keeping are often still at loggerheads, and domestic animals are evicted from nature and game reserves. However, there is increasing evidence that ”co-conservation” is possible. Traditional breeds often have a history of interaction with wildlife, and habitats have evolved through grazing pressure from both wildlife and livestock. Local breeds and species may therefore even be necessary to maintain an ecological balance and to conserve certain ecosystems.

- In the Bharatpur bird sanctuary in Rajasthan, buffaloes were initially evicted from the park area. However, without their grazing pressure, certain types of vegetation started to overgrow bird nesting habitats. This led to the readmission of buffaloes.

- With regard to the Kumbalgarh Sanctuary (Rajasthan), pastoralists maintain that browsing by camels actually increases tree growth rates. An NGO (LPPS) is making an effort to validate this claim scientifically in order to have a basis for negotiating a compromise between herders and the Forest Department.

2.5 The concept of ”community ownership”

It is noteworthy that many rare species and breeds are associated with marginalized communities whose identity is based on their relationship with these animals (see Box 7).

BOX 7: Examples of pastoral groups as "guardians" of specific breeds/species

-In India, the famous Gir and Kankrej cattle breeds of Gujarat have been developed by different subgroups of the Rebari pastoral community. (While these breeds have been successfully exported to Brazil and the southern USA, their original "creators" are losing out in the struggle for pasture area.)

- Also in India, the dromedary has a strong cultural association with the Raika, who are regarded as a hereditary camel-breeding caste. Although camel breeding has become largely uneconomical, some Raika hang on to them "because they are part of our heritage".

-The Rathi cattle, at home in northwestern Rajasthan, are owned mostly by Rath Muslims, whereas the famous Sahiwal cattle breed is in the hands of another Muslim group.

- The Gujjars of the Himalayan foothills and the Toda tribe of the Nilgiri Hills in southern India keep specific buffalo types.

-In South America, the Andean Aymara community has a strong connection with the alpaca and think that "the day the alpacas disappear, the world will disappear. If the Aymaras do not nurture the alpacas, they will be gone the way they came and the end of the world will come."

Since their relationship with specific animals is part of their identity, many pastoralist groups ultimately also feel some sense of responsibility for the welfare of these species or breeds. Some of them, such as the Raika and the Fulani, even believe they were created by God to take care of them and a sense of guardianship is a fundamental part of their culture. This would seem to present ideal preconditions for "community-based" conservation. Indeed, for the famous Sahiwal cattle - regarded as one of the best zebu dairy breeds - it is reported that its hereditary keepers are extraordinarily committed to keeping this breed in a purebred state, resisting efforts to convert them to crossbreeding.

The importance of pastoral communities and intermediary NGOs for conservation is supported by the experience in industrialised countries, where successes in stemming AnGR erosion can be credited almost entirely to the enthusiasm of breeders and NGOs. Furthermore, they have been achieved practically without state support. Since the "Gesellschaft zur Erhaltung bedrohter Haustierrassen" (GEH) took up its activities, no breed has become extinct in Germany, although they have not received any financial help from the government.

2.6 The role of women in managing livestock genetic resources

Since most livestock is cared for by women, they obviously have a crucial role in conserving local breeds and this must be taken into account in technical cooperation projects. Since, in comparison with "improved breeds", local breeds require fewer inputs and therefore ease women's work load considerably, women are also the ones to gain most from projects directed at conserving local breeds.

2.7 Benefit-sharing: recognition of animal breeders' rights

As far as animal genetic resources are concerned, there is no movement to assert farmers' rights, and the question of intellectual property rights has been seen as less urgent with regard to animals than plants. Such complacency is not justified, since there are already examples of genes being appropriated from indigenous breeds for insertion into commercial strains. According to some reports, the patented "booroola" gene that is responsible for a high incidence of multiple births in Australian Merino sheep is thought to have originally been derived from the Garole sheep kept by the Haidar community in the Sunderban area of India. Genes from the Indian Vechur cow, a dwarf breed famous for its resistance to disease and heat, are also said to have been patented in the UK. In its home state of Kerala, on the other hand, it has become virtually extinct due to a state breeding programme that prohibited the use of Vechur bulls for breeding.

Animal breeding companies have already begun to prospect indigenous livestock breeds, especially pigs, poultry and cattle for desired genes. Since these industries zealously guard and patent their own genetic materials, there is a moral imperative for extending similar protection to traditional stockbreeders, even though this might be difficult enforce in practice. Furthermore, some form of benefits

(such as access to veterinary care) could also provide a strong incentive for farmers/pastoralists to continue raising certain breeds.

3. DISCUSSION AND CONCLUSIONS

3.1. Constraints for development cooperation

- ***Policy-makers are still caught in the "Transfer of Technology" philosophy.*** Among policy makers (in both GOs and NGOs), there is still an ingrained belief that imported "exotic" breeds are better. There is very limited awareness on the problem of animal genetic resource erosion and on the value and relative advantages of indigenous breeds.

- ***Lack of planning and participatory skills among representatives of government agencies.*** Even if the desirability of maintaining indigenous breeds is acknowledged and has become part of the official policy, there is no expertise in designing respective programmes and well intended measures do not reach the field level. Links between the field (livestock breeders) and representatives of the official system are virtually non-existent.

- ***Official systems often do not attach any value to minor species and discriminate against their products.*** The activities of government departments often focus only on a couple of species (usually cattle and poultry), while other species of major significance to the poor are totally ignored. In Rajasthan, camel milk was recently declared as hazardous to human health, based on the fact that it is not mentioned in the Dairy Regulation Act which dates back to the 1960s !

- ***So far all efforts concerning animal genetic resource conservation have been extremely centralized.*** The main actor has been the FAO. Although it acknowledges the need to integrate "indigenous knowledge into conservation", the necessary instruments have not yet been created. In order to develop momentum, activities need to be decentralized, which requires a concerted effort to establish a dialogue with and active involvement of both NGOs and animal breeders***.***

- ***Traditional institutions for maintaining livestock genetic diversity have remained invisible due to the absence of a participatory approach in animal breeding.***

3.2 Potential for development cooperation

A reorientation of livestock-related development cooperation from a focus on productivity to genetic diversity would necessarily entail a move towards endogenous approaches to development. Livestock genetic diversity is a phenomenon mostly linked with poor and/or traditional communities, and inputs aiming to conserve local breeds by improving economic returns could help them to reduce poverty.

Technical cooperation aimed at conserving livestock genetic diversity could and should include the following approaches:

3.2.1 at the local level:

- Support for research on the role of indigenous knowledge in the creation and maintenance of livestock diversity.

- Capacity-building of NGOs in supporting communities to maintain and develop their livestock

- Support for local and regional livestock shows

- Development of recording techniques and teaching/extension materials suitable for illiterate people

- Support for the evaluation of economic benefits of local breeds in the context of local livelihoods

- Support for experimentation with the processing of products of local livestock breeds into specialty items

3.2.2. at the national level

· Training of personnel of agencies interacting with people concerned with livestock (e.g. veterinary, animal husbandry departments; extension services) in participatory approaches

· Reorientation of these agencies from crossbreeding towards developing local livestock breeds within the context of ecological constraints

· Integration of existing local livestock breeds into regional and land use planning

· Securing of land rights and rights of access for pastoral communities

· Elimination of subsidies and credit for resource-intensive agriculture in marginal areas

· Elimination of subsidies and economic incentives for crossbreeding with exotic breeds

3.2.3. at the international level

· Eliminate support for the export of intensive livestock production systems and high performance breeds

· Extend intellectual property protection to traditional animal breeding communities

3.3. Conclusions

- A paradigm shift in livestock production from productivity to maintenance of genetic diversity and a focus on developing indigenous livestock resources could lead to a greater share of benefits accruing to smallholders and marginal producers throughout the developing world.

- Projects and programmes to conserve and develop indigenous livestock resources must build on local knowledge and institutions. Recovery and strengthening of animal breeding-related IK must be the starting point of all such interventions. In this respect, animal breeders can learn a tremendous amount from participatory plant breeding.

- For such a decentralized effort, it is mandatory to involve NGOs and other community-based organizations. So far, NGOs in developing countries have not taken up the issue, and, at least in India, many of them even continue to promote crossbreeding. Equipping NGOs with the necessary skills to conduct conservation and development projects in cooperation with scientific institutions would appear to be a promising option. The successes in industrialised countries in animal breed conservation have mostly been due to such coalitions, where NGOs work with and support breeders on the one hand, but are also networking with universities on the other.

- Unlike in the industrialised countries, there is probably very limited scope for conservation through hobby-farmers, who keep certain breeds even in the absence of adequate economic returns. Hence efforts to conserve livestock genetic diversity cannot be limited to circumscribed conservation projects (which basically represent a museum approach) but require support through an enabling environment, such as policy decisions to ensure pasture bases for animals and a demand for their products.

- Disproportionately large numbers of breeds are associated with marginal environments and marginalized communities such as pastoralists and, in India, so-called tribals (Adivasi). This presents a chance to combine conservation programmes with socioeconomic support and poverty alleviation programmes. In fact, AnGR conservation provides an additional rationale for pastoral development programmes, since it can be argued that, in many instances, indigenous livestock breeds cannot be safeguarded without the pastoral societies that have nurtured them.

- Judging by the experiences gained in PGR and in AnGR conservation in the industrialised countries, the major challenge facing development cooperation is to establish working partnerships between animal breeding/pastoral communities, NGOs and scientific institutions and to create instruments for their cooperation. For this, the ”network approach" that has been

adopted in respect of crop biodiversity might provide an appropriate model that could be transferred to the livestock sector.

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5. ACKNOWLEDGMENTS

I would like to thank Simon Anderson, Roger Blench, Beate Scherf and Brigitte Kaufmann for providing me with information and/or unpublished documents, Evelyn Mathias for feedback, and Conny Almekinders for good collaboration and valuable comparisons with PGR.