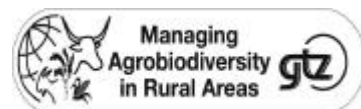




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Experiences in Farmer's Biodiversity Management

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Indigenous Institutions For Managing Livestock Genetic Diversity in Rajasthan (India)

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Introduction

Rajasthan, a state in the Northwest of India, is known for its desert conditions and harsh climate with maximum temperatures up to 50° C. Mean annual rainfall ranges from less than 100 mm in the extreme west and over 1000 mm in the east. The yearly amount of precipitation is also extremely variable and, on average, every third year witnesses a shortage of rain while every eight years there is a major drought or famine.

Rajasthan has long been famous for the excellent quality of its livestock, which contribute a significant share to the national milk and wool output. Although it hosts only 7% of India's cattle population and 21% of its total sheep, Rajasthan provides more than 10% of the national milk yield and more than 40% of the wool.

Representing a hub of domestic animal diversity, Rajasthan is home to a larger number of officially recognized livestock breeds (see box). It is significant that the majority of these distinct, phenotypically well-defined breeds hail from the western, i.e. arid part of the state. The Imperial Gazetteer for Rajputana from 1908 noted that "the main wealth of the desert lands of the west and north consists in the vast herds of camels, horned cattle, and sheep which roam over the sandy wastes and thrive admirably in the dry climate". According to the same source "in the east there is nothing remarkable about the livestock".

Officially Recognized Livestock Breeds of Rajasthan

7 breeds of cattle: Tharparkar, Kankrej, Nagauri, Gir, Rathi, Malvi and Haryana

8 breeds of sheep: Marwari, Jaisalmeri, Nali, Magra, Pugal, Chokla, Malpura and Sonadi

3-4 breeds of goat: Marwari, Sirohi, Jakkharana

several camel breeds: Bikaneri, Jaisalmeri, Mewari, Marwari etc.

1 horse breed: Marwari

Examples of Threatened Breeds/Species

Nagauri Cattle

The Nagauri cattle from the "Swalak" area in Nagaur district (250 mm mean annual rainfall) is very famous as a draught breed and used to be exported to Multan, Sind and other regions. It was developed by Jat farmers to resemble a horse rather

than a cow with a very light body and has no superfluous fleshy hangings at dewlap, prepuce, or testicles (Akhil Bharat Krishi Goseva Sangh 1981). This particular phenotype was achieved by both selective breeding and specific management practices. The young calf is starved from milk so that it will never develop fat cells and always remain lean. Later its access to roughage is also restricted to prevent the rumen from expanding. A normal diet is started only after the rumen has been stunted. (Akhil Bharat Krishi Goseva Sangh 1981). In the 1980s pairs (*jori*) of Nagauri bullocks for draught were still very popular and purchased by customers from Punjab and Uttar Pradesh for top prices (more than 20,000 Rs.). Currently this breed is very much in decline because the demand for fast bullocks has decreased.

Tharparkar cattle

This is a dual-purpose breed from the India-Pakistan border area, which is highly disease resistant, and heat tolerant (due to black skin and white coat). Even under the extremely harsh climatic conditions of the Thar Desert, cows give 9-11 or sometimes even 16 kg of milk per day with a very high fat content. Earlier bullocks were also popular as draught animals. This breed is regarded as "threatened", but estimates of the current population size vary dramatically. Some experts assume that the entire cattle population of the two districts where it occurs represents "Tharparkar", which would amount to a population of 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 "Sindhani".

A rapid rural appraisal session with farmers revealed a complex set of reasons for the disappearance of the Tharparkar breed (Köhler-Rollefson, 2000):

Political: After partition, most purebred animals had ended up on the Pakistani side of the border. Formerly, cattle breeders had undertaken seasonal migrations, but this has become impossible.

Gene drain: Some time later milk sellers from Jodhpur had purchased a large number of the remaining high-quality animals.

Crossbreeding: The Tharparkar breeding area has become infiltrated with cattle belonging to other breeds (Kankrej in the south and Rathi in the north), on the search for pasture. This has led to unintentional crossbreeding and dilution.

Ecological: The pasture base - Sewan grass that used to be abundant - has become degraded, partly due to the influx of animals from other areas.

Economic: Since there is no longer a demand for the male animals as neither draught bullocks, nor can they legally be sold for meat, people also have lost interest in breeding these animals

The one-humped camel (dromedary)

India has the third largest camel population in the world and the camel has long represented an important component of Rajasthan's agro-biodiversity and cultural heritage. Even today, there is much demand for male camels as a source of draught

power by the poorer sections of the rural community. Nevertheless, according to the latest available census data, the camel population is dwindling rapidly, with especially the proportion of young animals being in severe decline. This is due to the fact that camel breeders opt out of the business despite prices for camels being high and increasing further 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 experience has shown that the provision of health care and access to good quality male breeding camels can contribute to stabilizing camel numbers, policy changes, such as reservation of grazing areas, are required if the camel population is to be maintained at a reasonable level (LPPS, 1999a).

Indigenous Animal Genetic Resource Management

In view of western Rajasthan's extreme environmental constraints with shortages of feed and water being regular features of daily life, it is surprising that the livestock of this area is not only hardy but also much more productive than in the eastern part of the state or other parts of India. We believe that the superior quality of the breeds in this part of the state is a reflection of highly developed local institutions for managing animal genetic resources and of mechanisms that ensure genetic improvement in the context of the given environmental limitations. Representing highly evolved and successful human adaptations to a high risk environment, these practices and institutions are manifestations of a long pastoral tradition and way of life (Köhler-Rollefson 1993, 1997).

While in western Rajasthan practically everybody owns a few heads of livestock for subsistence purposes, there are also communities, which are specialized pastoralists and supply livestock and its products for sale or barter. These include the Rebari/Raika, Gujjar, Sindhi Muslims, Gairi and Bhats. The most famous among these are the Raika who earlier took care of the camel breeding herds kept by the Maharajahs. Today only a minority of the Raika still breed camel while many have become large scale sheep breeders or left the pastoral occupation altogether. It is mainly these pastoral communities whom the knowledge about breeding is vested with. This will be illustrated with a few examples.

Camel Genetic Resource Management

For camels, the Raika, a hereditary camel breeding caste, keep oral records of genealogies, tracing the ancestry of their herds in female lines. (Every animal in a herd has a name and a female animal is usually named after its mother.) They seem to conceive breeding stock more as communal heritage rather than private property. If a person owns a good-quality male, he is obliged to make it accessible to anybody else who needs his females to be mated. Some breeding bulls can attract hundreds of females, clearly going beyond their service capacity. On the other hand, the sale of female camels to anybody outside the community is traditionally not condoned by the community (although this is now changing). Female animals usually change ownership only at the occasion of marriages, being sent as *dhamini* when the bride joins her in-laws.

While, due to limited economic returns, not all camel breeders can afford to be finicky, the majority select male camels used for breeding with great care, taking into account a wide variety of criteria, such as looks, size, colour, temperament and milk yield of the mother and other female relatives. In the first year, a male camel is allowed to service only a limited number of females - but if the offspring turns out well, is he used more widely. They see it as a good sign if the calves "look more like the father than the mother". The Raika also profess to prefer bulls that sire a high proportion of males (although according to scientific genetics this is not possible). In order to prevent inbreeding they routinely change the stud after four years (Köhler-Rollefson, 1993, 1997).

The Raika are a good source of information in regards to the traits and advantages of local breeds and strains. For instance, they had been aware of the Malvi camel, a breed with high milk potential, for decades before it came to the attention of outsiders and was reported scientifically (Köhler-Rollefson and Rathore, 1996).

Cattle Breeding Institutions

Castration

Cattle are kept by people from all castes. The superior quality of the cattle breeds in western Rajasthan by comparison with the rest of the state has been linked to the fact that in "Marwar" (western Rajasthan) village communities meted out strict punishment to people who did not castrate male cattle that had not been sanctioned by the community as fit for breeding (Kothari, pers. comm.). There was a special caste in charge of castration, the Satyas (Alstrom, 1999). In "Mewar" (southern Rajasthan) where farmers depended mostly on crops and kept only a small number of animals for work or dung production, such regulations did not exist. In some parts of Marwar, the old practice of community-enforced castration now also seems to have fallen into oblivion. To some extent this is because the community is no longer prepared to carry out this socially debasing task (Alstrom, 1999). In addition with few or no economic benefits emanating from cattle breeding there is no point in upholding the tradition.

Village Bulls

A survey conducted by Lokhit Pashu-Palak Sansthan in 50 villages of the Godwar area (a part of former Marwar) revealed that the institution of the village bull is alive and well. This is a truly community embedded institution with villagers jointly selecting the animal and each household contributing to its purchase cost, sharing the expense of its upkeep (in green fodder and grain) and the salary (in cash and in kind) of a keeper. Most of the villages also maintain a communally owned buffalo (*pardah*) along the same lines, but for this animal it is also necessary to provide a stable. Some villages go to great expense to obtain good quality bulls and buffaloes from long distances and superior genotype (LPPS, field notes).

Indigenous Breed Classification

The Godwar Raika also are associated with and have created a cattle breed that is locally known as "Nari", but has not yet been documented scientifically. Its core breeding zone is in the area between Nana Bera in Pali district and Sirohi. This breed is said to come from the Aravalli forest (*nar* means hilly area) and kept in migratory husbandry systems. Distinguished by its concave ("dished" face, white markings on the face, grey body colour and long lyre-shaped horns, it is a dual purpose breed for

both milk and draught that is also extremely drought resistant. Villagers come from near and far to purchase male animals from the Nari breeding area in order to upgrade their own herds (LPPS, 1999b and field notes).

Gaushala

Another type of traditional institution that makes a contribution to maintaining livestock genetic diversity is the gaushala. Gaushalas are religiously motivated cow sanctuaries. Usually initiated by wealthy or religious people but co-funded by donations from the general public, they feed and take care of cattle that are no longer wanted by its owners, because of old age, sickness, or lack of productivity. During droughts these gaushalas have a valuable buffer function. Against a donation, they accept cows that their owners can no longer support because of the unavailability or high price of feed. Once the drought is over, the gaushalas dispense these animals back to the community, again against a fee. Some of these gaushalas also make attempts to conserve and improve local breeds.

Sheep and Goat

Sheep raisers usually recruit breeding rams from own herds. Based on the quality of their dam, promising lambs are singled out at birth and provided with special care and feed. Use for breeding starts at the age of two years and lasts for three years. Female sheep all have individual names. If a Raika wants to start a herd, then all his livestock-owning relatives will contribute animals, up to 20 head each (LPPS field notes).

In regards to goat there is the practice of "*amr-bakra*". As a religious act, some goat keepers devote male goats to God by attaching a small ring in one of his ears. This goat is then set free in the village and can be used by others for breeding. Everybody will feed this animal and nobody will dare to do it any harm.

Donkey

Rajasthan has a donkey population of almost 200 000 head, according to official sources. Exclusively members of lower casts, such as Kalbelia Yogis, Kumhars and Bhat, keep this species. For them it is indispensable as a beast of burden carrying loads practically without supervision. Some of its products, including milk and dung, are valued in traditional medicine. Donkeys also ease the workload of women. But from the official side, this animal remains ignored and stigmatised. The donkey mela held in Bavgarh Banda near Jaipur has been an annual event for a couple of hundred years and is attended by breeders and traders from several states, but its organizers complain that they have never been able to attract a bureaucrat or politician to preside over its inauguration function!

According to the scientific view, the donkeys of India are not differentiated in the breeds. However, a quick survey among the buyers and sellers at the mela revealed that local knowledge distinguishes between at least three types of donkeys, Kathiawari, Ner and Jhadi. Moreover, the Kathiawari donkey, imported from Gujarat fetches quite considerable prices - raging from Rs. 5,000 - 10,000, ergo represents a considerable economic asset - of higher value than most cows or even camels! Even more astonishing is the fact that male donkeys that can be used for mule production, i.e. are willing and able of mating with horse mares, are valued at more than 150,000 Rs. (LPPS field notes).

Conservation of grazing areas

Going beyond the scope of this paper, but deserving to be mentioned are various traditional institutions that protect grazing areas with the aim of reserving forage for times of drought. One example is the "oran", a piece of land belonging to a temple and protected by a local deity. In orans the cutting of trees and grass is prohibited but they are opened up for livestock grazing in severe crises (Robbins, 1998).

Government Interventions in Animal Breeding

Unfortunately, the intricate community-embedded mechanisms for managing animal genetic resources have a very low visibility to the outsider - they are not evident unless one looks for them and takes the time to investigate. Accordingly, the rhetoric emanating from the formal institutions dealing with the livestock sector decries livestock breeders as backward, and asserts that the local breeds have deteriorated due to inbreeding, indiscriminate cross-breeding, scrub bulls, etc. With respect to cattle it is stated that its keepers are not aware of the need to rotate bulls to prevent inbreeding, nor know about the oestrus cycle and the proper timing of breeding. For sheep, it is said that farmers have not yet begun to appreciate scientific facts of breeding, that their methods of breeding and management are antiquated and uneconomic and that they have no breeding policy (Kavoori, citing Narayan 1948).

Against this background, official policies have long been oriented towards improving cattle, sheep and goat breeds by crossbreeding with exotic breeds.

Cattle

Crossing of local cattle with Jersey, Red Dane and Holstein was started in the early 1970s and initially restricted to peri-urban areas. After 1974 when the World Bank provided a loan for expansion of dairy cooperatives, it was extended to the rural areas. Currently, the government of Rajasthan is operating 2700 points for artificial insemination with exotic breeds. But this intervention is not popular with the rural population, especially women who regard it as unnatural. Furthermore it entails loss of control over the whole process of breeding since there is no chance to actually see the provider of the semen. For the rural people, "Holstein" or "Jersey" are meaningless and interchangeable terms and agreeing to A.I. equates an act of blind faith. Until recently, veterinary doctors had to perform a certain number of inseminations per month, in order not to face salary deductions.

In 1998, the breeding policy was revised and now gives emphasis on the conservation and improvement of indigenous breeds, which are to be promoted if local breeders are interested. A.I. with exotic breeds is to be performed only when demanded (Government of Rajasthan 1998)

Goats

Because the indigenous goats were conceived as inferior, the Indo-Swiss Goat Development and Fodder Production Project set out in 1981 to promote crosses of the local Sirohi breed with Alpine and Toggenburg goats from Switzerland. The project later came to the conclusion that the crosses did not perform as well as expected and that the productivity of the local Sirohi breed was higher than had been assumed (Kropf et al., 1992). Henceforth it switched to the propagation and genetic improvement of the Sirohi breed.

Sheep

The history of interventions by the especially instituted Sheep and Wool Department that was intended to upgrade the local sheep breeds by cross-breeding with exotic rams from Europe has recently been chronicled (Kavoori, 1999; Ray, 1999). These efforts to upgrade the local breeds by crossbreeding with more prolific and better wool yielding exotic sheep have not gained acceptance by sheep raisers (due to high mortality, problems with feed supply and other factors) and failed to achieve any measurable impact.

Conclusions

The migratory pastoralists of Rajasthan are conceived as marginal people that are bound by traditions and unwilling to change by the government, and this perception is shared by much of the rural population. The Raika, in particular, have the reputation of being the most "socially-backward" caste. But it is precisely their reluctance to give up the old ways, their tenacity in sticking to time honoured customs (such as not selling female animals), their refusal (or inability) to abandon old patterns of animal production which also has up to now conserved what is left of Rajasthan's indigenous animal genetic resources.

In view of Rajasthan's frequent droughts and rapidly depleting groundwater supplies, pastoralism probably represents by far the most sustainable land-use option. Because the Raika generally do not own land, intensive animal production relying on especially grown green fodder is unlikely to represent an option for them. Basically the Raika have only the choice of continuing their pastoral existence or of merging into the urban labour force. If that happens, then this will probably be the end of the camel, the sheep genetic diversity and of the Nari cattle.

By signing the Convention on Biodiversity (CBD), India has committed itself to "respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and to promote their wider application". Furthermore, the CBD explicitly states that biodiversity should be conserved in the surroundings it was developed, and in the case of livestock this refers to pastoral and farming communities.

In essence, the CBD provides a legal tool for the Raika to get credit for their achievements as animal breeders and creators of local breeds and to press for benefits, such as free animal health care and medicines, in return for the role they play as guardians of livestock genetic diversity (Köhler-Rollefson, 2000). Explaining this concept to them is difficult, since their universe often only encompasses a few villages and many of them are hardly aware of the existence of the state and center government, but it is a challenge that needs to be tackled by NGOs and other actors in rural development.

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