M'Bororo cattle

The M'Bororo zebu is only present in the region on a temporary basis, because of transhumance, and is found mainly in the central-western and southwestern regions of Chad. This animal – whose local names include Bororo, red Peul zebu, red Fulani, Djafoun, Rahadji, Fellata and Foulata – is finely built but very large, measuring between 140 and 150 cm at the withers. It is perfectly adapted to long marches, and therefore to transhumant pastoral systems. The dewlap hangs low and the horns are carried high, in a lyre shape, reaching between 0.8 and 1.2 m in length. The skin is a uniform red colour. At birth, both male and female calves weigh between 15 and 20 kg and, under natural conditions, the adult weight ranges from 400 to 500 kg for males and 350 to 450 kg for females. Weights vary widely according to the seasons and to the amount and quality of fodder available.

The M'Bororo zebu is a hardy breed that adapts well to different climatic conditions. In Chad, it can be found in the hot dry regions as well as in the wet regions with trypanosomiasis. The animal is the major capital resource of many herders in the region. M'Bororo cattle have a high value as a form of capital accumulation. Taking mortality into account, and usage to supply household needs, these herds have an annual capital growth of between 3 and 5 percent. This is comparable to the interest rate paid on an average bank account and, in the absence of any reliable banking system, is a more than acceptable return.

M'Bororo cows do not have a very high reproductive capacity or a high milk yield. Instead, these herds form part of a complex economic system that also involves sedentary farmers and that is not easy to quantify. On fields left fallow, the cattle supply dung, which is needed for the subsequent

THE WELL NEAR KABELEWA VILLAGE (N'GUIGMI), THE NIGER

THE M'BORORO IS PERFECTLY ADAPTED TO LONG MARCHES. ITS LYRE-SHAPED HORNS ARE HIGHLY PRIZED BY THEIR OWNERS

year's crop. They feed on crop residues, such as straw and bran, and also play a role in a social context, bestowing status on their owners and supplying meat for special occasions, a modest amount of milk on a daily basis, and hides to make tents.

Fulani cattle

The Fulani zebu, also known locally as the Fulbe, Peul, white Fulani and Akou, is found in the Mayo–Kebby region to the west of the River Logone, where it was introduced in 1915 by the Peul, who had emigrated from Cameroon. Today, the breed is reared extensively by sedentary and semi-nomadic Peul, especially on the outer edges of Chad. A white coat is the dominant characteristic of this zebu. Its horns are lyre-, cup- or crescent-shaped. The adult male has an average height of between 125 and 140 cm at the withers.

The Fulani is closely related to the M'Bororo zebu. It has the same easy speed of animals accustomed to covering long distances and a very fine coat. However, its hump is better developed and is often lopsided, especially in the female. Its rump is more rounded and well developed, making this zebu particularly sought after by herders who are rearing cattle for meat. One interesting trend, which merits further attention, is the increasing tendency for herders to abandon the M'Bororo in favour of the Fulani breed as they concentrate more on meat production.

Arab cattle

The Arab zebu – whose local names include Choa, Shewa and Wadara – is not widely found in the lake region. Traditionally, this breed can be found between 11º and 13ºN in the Sahelian–Saharan and Sahelian–Sudanian zones, although there is an increasing tendency for populations to spread further south.

NEAR DOUTHY VILLAGE (DAMASSAK), NIGERIA

ZEBU ARE A MAJOR CAPITAL RESOURCE FOR HERDERS

Average to small in size, the Arab zebu has a straight nose, a wide muzzle and a squat frame that is well fleshed. The hump is pronounced in the male, much less so in the female, and the limbs are short but fine. The horns are generally short and point outwards. The coat is usually dark red or dark brown, although some animals are black and white or red and white in colour. This breed has a sound capital value since it fetches a good price once butchered.

Kilara cattle

The Kilara zebu is generally considered to be a different-coloured variety of the Arab zebu, although no studies have been carried out on its provenance and characteristics. To the Kilara should be added the variety known as Wadara by the Arabs of Chari–Baguirmi, in central–western Chad. By rights, the term "breed" rather than "variety" should be used to describe these zebu cattle, which are linked to a region or an ethnic group. However, in the absence of any conclusive studies on the animals' identification and traits, the usual term has been adopted, although this does not mean that they might not, in fact, be breeds.

Toupouri cattle

This breed, whose local names include dwarf Logone cattle and Massa cattle, is the smallest found in Chad. Its height ranges from 110 to 120 cm at the withers for animals aged four years and over. Its weight varies between 100 and 150 kg. Its main quality is its resistance to trypanosomiasis, which is the major reason why it has acclimatized so well to its habitat. The breed is becoming increasingly dominant in areas where the Arab zebu is traditionally found. However, pure breeds have become rare, which means that this is an endangered breed.

THE WELL NEAR KABELEWA VILLAGE (N'GUIGMI), THE NIGER

SMALL RUMINANTS REPRESENT A FLEXIBLE, MINIMAL CAPITAL INVESTMENT AS WELL AS PROVIDING A SUPPLY OF FRESH MEAT

SMALL RUMINANTS

Sheep and goats are hardly ever reared on their own in the region, but are almost always mixed in with herds of cattle, or even camels. It is not easy to define which breeds are raised by which pastoralists because this often depends on the availability of animals. There are three types of small ruminant pastoralists in the areas around Lake Chad.

- **Agropastoralists who are comfortably off and who also own cattle and horses.** These are mainly Arabs from the Oulad Issé ethnic group. Their flocks consist mainly of goats and number no more than 20 animals, with at least one horse, which indicates the social status of the owner. There are few sheep in the flocks, since lamb and mutton are only used on special festive and religious occasions. More than 75 percent of flocks consist only of goats. Most of them do not even have a male for reproductive purposes, since the pastoralists do not select and breed their animals but rather keep and use them with very little investment.
- **Agropastoralists with more modest revenues.** These people have fewer cattle, and their sheep and goat flocks represent a more significant investment. The people grow maize during the rainy season, using the residues to fatten their animals. They sell milk and butter and will generally send five sheep or goats to market in any one year. These are the region's real breeders of small ruminants, which represent a significant source of revenue. The flocks, together with breeding males, are kept collectively.
- **Lakeshore dwellers who grow maize and millet and keep small flocks, mainly of goats, on a casual basis.** These are users of small ruminants, rather than breeders in the strict sense. Because these people have no facilities for keeping food fresh, having a small flock of animals is the only way of ensuring a supply of fresh meat.

Arab sheep

The Arab sheep – whose local names include black Moor and long-haired Moorish sheep – is a large animal, the

male of which stands 80 cm high and the female 70 cm. The coat is black and fawn in colour and the hair is generally long. The horns are smaller in the females. Their ears are often pendulous and floppy rather than upright. This breed produces excellent meat and fattens easily on crop by-products. Their meat is used for feasts such as *Tabaski*.

Peul sheep

The Peul sheep, also called the Bororo sheep, can be found during transhumance migrations and is the largest of the sheep breeds in Chad. The male has an average height of 85 cm, while the female generally reaches 80 cm. The distinguishing feature of the Ouadah variety is its two-tone coat, which is black or brown in front and white behind, with the two colours meeting halfway along the body. The Waïla variety differs in having a coat that is uniformly white. The Peul breed is short-haired and has long, pendulous ears. A high percentage of the females have horns. Dewlaps are rare, but long – up to 15 cm. The nose is straight, strongly hooked in the case of the male, while the tail is relatively thin and ends at the hocks.

Kababich sheep

The Kababich sheep is the same size as the Peul sheep, but its rump is low, ending in a tail that is thicker near the base, where it may have a circumference of up to 30 cm. The tail is also very long, always extending below the hocks and sometimes reaching the ground. The distinguishing trait of this breed is its fawn coat, although it is sometimes fawn and white. Local names include Kababish and Sudan desert sheep, and it is often called the Peul sheep.

Mayo–Kebby and Kirdimi sheep

The Mayo–Kebby sheep is sometimes found on the shores of Lake Chad and is very similar to the Arab sheep. It is known locally as the western sheep and as the Poulfouli, but its presence in the region is due entirely to trading.

Also coming from southern Chad is the Kirdimi sheep, the smallest of the sheep breeds found in Chad. Its local names include southern dwarf sheep, Kirdi and Djiallonké. The Kirdimi has as many varieties of coat colour as the goat breeds, the most common being all-black or black with a red belly.

Sahel goat

The lake region is dominated by the Sahel goat, whose local names include Arab goat and Sahelian goat. However, herders also make use of a variety of other breeds, depending on the location, the purpose and their ethnic group.

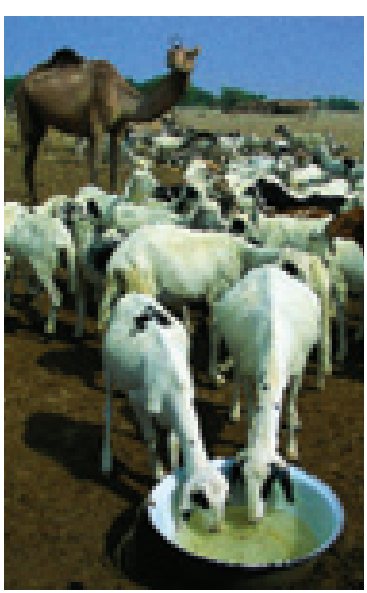
- The Moussouro or Kanem goat is small, between 45 and 55 cm in height and from 20 to 30 kg in weight.
- The nomadic Arab goat is large, between 75 and 85 cm in height and from 35 to 40 kg in weight.
- The western goat is about 69 cm in height and from 25 to 30 kg in weight.
- The Baguirmi or Massakori goat is a cross between the Sahelian breed and the southern breed.

Without a detailed study (inventory and breed characteristics), it is difficult to say how many breeds actually exist, especially when names have been given by the pastoralists without linking them to specific forms of utilization.

Kirdimi goat

The Kirdimi goat is reared by the sedentary populations of the south. Known locally as the southern dwarf goat, Kirdi and Djallonké, this goat, like the Kirdimi sheep, is found on the shores of the lake, aided, no doubt, by its well-known resistance to parasites. In the south, this goat represents the sole source of meat in the tsetse-fly (trypanosomiasis) zones although, unlike the Sahelian breed, it is not kept for milk. Around Lake Chad, where trypanosomiasis is not a major problem, there appears to be no justification for its use.

This small goat has short, coarse hair that is white, yellow, brown, or sometimes black. It varies in height from 45 to 55 cm, and its weight ranges from 15 to 25 kg. The meat is used for everyday consumption. The animal does not appear to be especially well adapted to its surroundings and people use it on an opportunistic basis rather than attempting to develop it into any particular breed [3.2].



THE WELL NEAR KABELEWA VILLAGE (N'GUIGMI), THE NIGER

SHEEP AND GOATS ARE GENERALLY MIXED WITH CATTLE, HORSES AND CAMELS

NEAR LOGONE-GANA VILLAGE, CHAD

THE HORSE IS A SYMBOL OF POWER AND PRIDE

PACK ANIMALS

In the case of both horses and camels, there is no particular species endemic to the Lake Chad Basin. Around the lake, during certain times of the year, more or less all the species found in the rest of Chad can also be seen, depending on migration and transhumance patterns and, in the case of horses, on an owner's desire to make a statement about his social position. Of the two, the dromedary is more extensively used as a pack animal and has been more thoroughly studied, but the horse has an undeniable social role.

Horses and ponies

The equine population of the region is very diverse and appears to be the result of random cross-breeding. However, three different morphological types can be distinguished, and these are used by various ethnic groups.

1. The Dongola horse, which is believed to exist in a relatively pure version in the Bahr-el-Ghazal region, is a light, finely built animal that weighs just 350 to 400 kg. Its coat is generally dark, with extensive

MATAFO VILLAGE (BOL), CHAD

THE RELATIONSHIP BETWEEN ANIMALS AND PASTORALISTS DEPENDS NOT ONLY ON ECONOMIC FACTORS BUT ALSO ON SOCIAL ISSUES

white patches on the extremities. It has large white socks, a broad blaze, broad white patches on the belly, hairless patches around the nose, and often different coloured eyes.

2. The Berber Arab horse is found almost everywhere. Bay is the dominant colour, with chestnut being rare in the lake region.

3. The Logone pony is very rare in the area around the lake. Traditionally, this breed, which is also known as Sara, Lakka, Kirdi, Mbaï, Kabia pony and Hoho pony, is reared on either side of the River Logone in southern Chad. It is extremely hardy and robust, with excellent powers of endurance, and is capable of bearing heavy loads. It is an animal well suited to difficult conditions although, since the end of tribal conflicts and the introduction of measures to ban traditional hunting, its use has been much reduced. This has almost certainly led to it becoming a species in danger of extinction. More information is required in order to establish any effective conservation programme.

The disappearing Logone pony

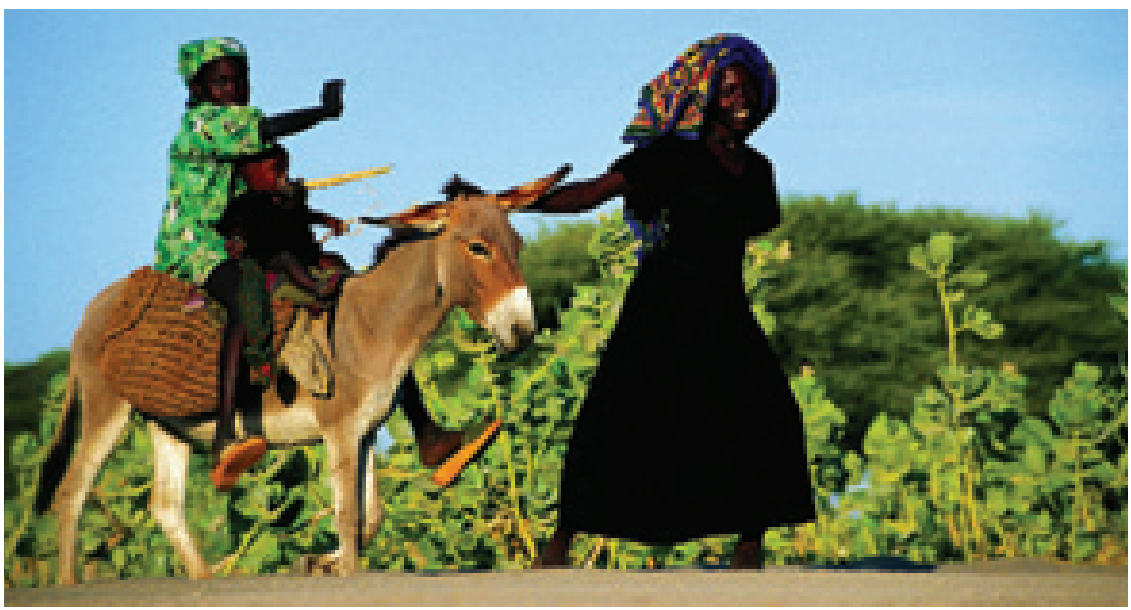
The Logone pony was once a familiar sight in wide tracts of Chad. At the beginning of the twentieth century there were some 40 000 examples of this breed in the country. The ponies were found between the lower reaches of the Tanjile, an affluent of the Logone River from which the animal takes its name, and the Kabia, which flows into the Fianga. The raising of this breed was essential to a whole range of ethnic groups, including the Marba, Kolon, Nancere, Musey, Lele, Mesme and Monogoy tribes.

For a long time, the Logone pony was an integral part of daily life in a wide variety of social settings. It was used as a cavalry horse, as a packhorse, for transport and for reasons of social prestige. However, the end of tribal conflicts, together with a greater use of cattle as draught animals, the banning of traditional hunting, profound social changes and the exclusion of the pony from dowry settlements, all led to a decline in the fortunes – and hence the numbers – of this hardy local breed. Today, just a few hundred of the ponies remain. Sentiment aside, the disappearance of the Logone pony from the Lake Chad Basin – a genuine prospect given the dramatic fall in numbers – represents a major loss to the genetic heritage of the region.

Donkeys

Only one breed of donkey is found in Chad, but it is relatively homogeneous. It is a short, hollow-backed animal of small stature, standing between 90 and 110 cm at the withers, and is mainly found in the Sahel. Its coat is grey, with a cross-shaped black stripe on the back. Over two million donkeys are estimated to exist in the four riparian countries, mainly owned by small farmers and pastoralists. The animals are rustic and can feed on poor grassland, and they are well adapted to rough tracks. Very few studies have been carried out on this animal, which is widely used for transport and especially for carrying water. Unlike horses and camels, donkeys are pack animals with no status, and it is quite common to see women riding them.

NEAR BOL, CHAD



DONKEYS ARE THE CHEAPEST MEANS OF TRANSPORTATION

THE WELL NEAR KABELEWA VILLAGE (N'GUIGMI), THE NIGER

FOR CENTURIES, DROMEDARIES HAVE BEEN USED FOR TRANSPORTING GOODS ACROSS THE DESERT. THEY ARE ALSO GOOD MILK PRODUCERS

Dromedaries

The first studies on the dromedaries found in Chad were carried out by the veterinary services of the then French colony at the beginning of the twentieth century. These animals are often used by nomads for transporting merchandise and camping materials, especially in Chad's Sahelian zone. They also produce milk. Three breeds of dromedary can be distinguished.

1. The Kanem dromedary is the smallest of all the breeds in the region. The hair of the coat is short and the most common colours are light fawn or white mixed with grey. This animal has the long neck found in camels used for riding, and it is accustomed to both *had* (*Cornulaca monocantha*) and saltwater. This type most closely resembles the dromedaries used by the Tuaregs of North Africa. Its habitat is the Kanem region of northwestern Chad.

2. The Mahamid or Arab dromedary is a pack breed, large in stature, measuring between 1.85 and 2 m at the withers, and is found in eastern and central Chad. Its coat is whitish grey to fawn in colour. The hair is quite long and slightly wavy. This dromedary is bred by the nomadic Arab tribes, the Batha and Ouaddaï, from the Sahelian zones.

3. The Gorane dromedary is reared by the Sahara's Toubou and is more accustomed than the Mahamid dromedary to harsh conditions, *had* and saltwater. It is a finely built animal, with a short, light head, and is excellent for riding over the rocky terrain, to which it is well accustomed.

Village dairy production around Lake Chad

The transformation of milk into other dairy products is carried out entirely by women, mainly during the rainy season, when milk fetches a lower price of 125 CFAF * per litre or less [3.3]. The three main dairy products are milk, curds and melted butter. Fresh milk is usually consumed in the morning, generally with added sugar and accompanied by bread or cake. It can also be used to prepare dishes. Curds, which are separated out during churning, are mainly used in the preparation of cereal-based dishes, to which millet or rice flour and sugar are added. These are the main dishes eaten by Muslims during Ramadan. Curds may also be used to accompany the traditional millet porridge. Eaten on their own, curds – or *rayib* – are consumed with sugar, rather like yoghurt. Melted butter is used widely in cooking, with two or three tablespoonsful being added to each dish. The people of the Lake Chad region, who are mainly Muslim, consume large quantities of fresh milk and curds and are also the major consumers of fresh camel's milk. Turning milk into cheese is a traditional and inexpensive method of conserving milk, which would otherwise be difficult to market. *Tchoukou*-type cheese is a dry cheese to which commercial rennet is added, although this can be replaced by locally available vegetable coagulants. The cheese is made into round or rectangular forms, each weighing around 100 g, which are dried for 24 to 48 hours in the sun. It takes 1.5 litres of milk to make 100 g of cheese. Each form sells at 250 CFAF, which is equivalent to 166 CFAF per litre of milk – an increase on the seasonal average. Cheddar-type cheese is pressed and warmed, and keeps well in village conditions, although making it requires a greater initial investment, since it requires a small dairy. It takes 10 litres of milk to make 1 kg of this type of cheese [3.3].

NEAR KANJRAM VILLAGE (MALAM FATORI), NIGERIA

PEUL WOMEN WITH MILK ON THEIR WAY TO THE MARKET

* 1 000 CFAF are equivalent to 1,52 euros.

N'GORTOGOL (N'GUIGMI), THE NIGER

BREEDS BECOME ESTABLISHED AND WIDESPREAD NOT NECESSARILY BECAUSE OF THEIR PRODUCTION LEVELS BUT AS A CONSEQUENCE OF THE DYNAMICS OF THEIR HERDERS. M'BORORO CATTLE, FOR EXAMPLE, ARE WIDESPREAD AMONG WODAABE NOMADS, DESPITE THEIR LOW MILK YIELD

NEAR BOL, CHAD

DIFFERENT ANIMALS SUIT DIFFERENT TRANSPORT NEEDS

BREEDING PRACTICES AND OBJECTIVES

The types of animal that farmers and herders in the region choose to rear depend largely on the purposes for which they are required. Geography is certainly an important factor when it comes to the creation and maintenance of animal breeds. As different tribes moved into the region, they brought their livestock with them. These animals have often taken both the names of the areas from which they originated and those of the ethnic groups that introduced them. It is remarkable to see how the Kouri or Buduma herders have managed to develop breeds so superbly adapted to their habitat, and the cattle have generally taken the name of the tribes. Heavily built breeds are not suited to travelling long distances, so they are useful for communities who have to some extent become sedentary. At the same time, there has been no parallel creation of specific breeds of sheep or goats, although various breeds occur at random, such as the Peul sheep.

All the breeds are related to the environment and have been modified by, or have adapted to, the systems used by the farmers and herders. Factors such as whether the system was intensive or extensive, or whether it was sedentary, nomadic or based on transhumance, have had a strong influence on the development of breeds. Having said this, it is hard to say whether the existence of a certain breed has forced herders to adopt a particular management system or whether the breed has been forced to change in order to fit in with a particular environment. Only careful phylogenetic research will provide the answer.

The same question mark hangs over the issue of determining the aptitudes of certain races. In Africa, this is often not so easy, unlike the situation in Europe, where specific traits, such as good milk or meat production in cattle, are clearly defined. However, that should not lead immediately to the assumption that the majority of cattle breeds in Africa are of mixed origin.

In fact, the specific traits displayed by a breed are already an indication that human beings have intervened with a genetic improvement programme, whether in a systematic, organized fashion or in a more empirical way.

Birth weight is one example of a selection criterion. In the case of animal growth performance, the selection criteria and the objective are the same and, for reproduction purposes, the herder will use males with the best growth performance given the feed resources available. He therefore combines his objectives with the environmental and herd situation.

The definition of a selection criterion is far more complicated when direct measures of the animal in question cannot be taken, or when the selection is directed at animals from another generation. Scientists carry out sophisticated selection programmes, using ascendants, descendants, collaterals and multiple selections. The breeder who wants to improve his milk production will choose a bull whose mother is a good milker. He will check the descendants and then give the go ahead for new mating. The desired objective dictates the choice of criteria and progressively shapes the species.

NEAR BOL, CHAD

MOST BREEDS REPRESENT THE BEST RESPONSE TO THE DEMANDS OF HERDERS IN A GIVEN ENVIRONMENT. THE SELECTION CRITERION OF THE KOURI BREED IS ITS ADAPTATION TO THE ISLAND ECOSYSTEM

BREEDS IN EVOLUTION

It could be argued that the ancestors of African livestock breeders did not have the advantage of the selection methods that we use today. However, it would be wrong to assume that they were unable to identify those selection criteria that responded to their objectives. Around Lake Chad there is living proof that these African herders were able to create a cattle breed that was perfectly adapted to both the particular conditions and the needs of the people who lived there. Meat and milk were equally required, in an environment that was especially difficult. With no sophisticated knowledge of genetics, the local herders almost instinctively responded to the challenge by creating the Kouri breed. The physiognomy of this breed is therefore based not on the characteristics found in literature, such as large horns, white coat and large size, but on the adaptation of the breed to the island environment. As a result, the breed represents a combination of genes best suited to the environment: a breed in evolution.

By the same token, it should be remembered that, in an African context, selection criteria are more complex. In Africa, it is not simply a question of economics, of developing breeds that produce more milk or more meat. Other factors need to be taken into consideration, such as the capacity of an animal to thrive on poor pastures and resist certain diseases, make the most of certain difficult habitats, retain a capital value for the household or a dowry, or be suitable for use in social and religious rites.

Perhaps we should ask ourselves how effective our own methods would be in responding to demands such as these.These aspects are often neglected because there is a lack of information, but these selection criteria are certainly behind the creation of many breeds.

BREEDING AND SOCIAL STRUCTURES

For most of us, a breed consists of a grouping of animals that we recognize as belonging to that breed. The principle of belonging may be based on inherited phenotypical criteria, such as the size of an animal's horns, the colour of the coat or the type of fleece, or it may be based on the animal's performance. The diversity of breeds existing at any one moment will depend on the constraints encountered in rearing them. Moreover, this diversity has increased over time, because the weight of history has forced each animal population to evolve according to the social relationships developing among peoples and to the environment. This is what happened with the widely distributed Peul zebu. Therefore, the existence of certain "varieties" cannot be called into question.

However, while there may be homogeneity when it comes to the criteria of belonging, different breeds of animals may be heterogeneous when it comes to other criteria. That, after all, is what makes it possible to improve average production and for breeds to evolve in response to changes in environmental or socio-economic conditions. Conserving biodiversity is as much about preserving the different breeds as it is about preserving diversity within each breed.

GENE BIODIVERSITY

In this context, cross-breeding does not undermine biodiversity unless the relative importance of one of the breeds declines over the years, and unless the genes present in that breed do not occur in other breeds. On the contrary, in certain cases, cross-breeding can actually preserve genes, either because a new breed has been created, or because the maintenance of the parent breeds, as a source of the cross-breeds, has an economic benefit.

It is therefore possible to think of livestock breeds as socially created phenomena that have been constructed according to a range of constraints imposed by the rearing system together with a range of objectives based on the intended use of the animal. Breeds that have become firmly established and geographically widespread do not owe their success simply to biological factors, such as high production levels and the ability to adapt to the most common livestock-rearing methods. They also owe it to the dynamics of the particular human group, be it a collective of livestock rearers or a private firm that has organized the selection of the animals, mastered their genetic potential, taken care of the promotion and sale of the reproductive stock and been responsible for sharing out the profits among the various participants. All of this strongly suggests that it should be possible to find just as many good qualities in other breeds as in the so-called "improved races", provided that a social grouping is prepared to take on the long and arduous job of organizing all that this entails.

However, breeds evolve naturally under the pressure of change, both from rearing systems and production objectives. This evolution can be achieved either by the grading of reproductive stock within the breed (selection) or by introducing reproductive stock from outside (cross-breeding). In practice, most breeds represent the best response by an animal population to the demands of herders in a given environment.

This line of reasoning leads to the logical conclusion that there is no such thing as a pure breed. No breed is "pure" in the sense that it has not been mixed.

BREEDS AND THE MARKET

It is important to look at breeds in an economic context. No livestock farmer will invest time and money in developing a breed unless it has something particular to offer, either directly, e.g. by providing meat or milk for the household, or indirectly, e.g. by producing items that fetch a high price at market. In both cases, humans and animals are sharing a common space and the resources of the land. Cattle breeds that are adapted to an extensive pastoral system are neglected in favour of crop growing when populations increase demands or when this kind of activity is more profitable. The system has to be flexible; the farmer may abandon certain breeds of domestic animal and concentrate on developing other breeds that are better adapted to a new set of circumstances. He may also modify a previously used breed in order to respond to changing demands in the marketplace. The examples that have been given of animal populations around Lake Chad show how this is happening.

The conservation of a breed in a static form can only happen in a relatively closed environment, where the product or the service is exclusively aimed at domestic consumption. In any case, animals always evolve in response to the needs of those who keep them. What is needed is a system that allows the animal to develop on the understanding that it is the animal adapting to human beings. It is nonsensical to think that this process can be halted, and much better to try to manage it and minimize the losses. Conservation initiatives will only work if they are undertaken within a well-defined economic context in which the farmer has a good chance of making a profit, and in circumstances that are socially acceptable. The pros and cons need to be carefully weighed up before embarking on such a process.

THE WELL NEAR KABELEWA VILLAGE, THE NIGER

CONSERVATION INITIATIVES WILL ONLY WORK IF THE PASTORALIST CAN MAKE A PROFIT AND IF CIRCUMSTANCES ARE SOCIALLY ACCEPTABLE

CONCLUSIONS

It seems that the primitive concept of existing species and selected breeds being invariable can be easily replaced by a much more evolutionary idea. That static and fixed notion has led to the universal adoption in most production systems of a few so-called "superior" or "improved" breeds. It has also led to the development of cross-breeding programmes and to the sale of improved reproductive stock and artificial insemination. But it has often failed in environments that are either unsuited to these breeds or that are in a state of evolution. If one focuses not on the animal but on the environment, which evolves in response to human actions, then it is possible to view the animal as a grouping of genes that are organized to take the best advantage of a temporary situation. The only problem lies in managing the time span. The very notion of "breed" is inextricably linked with the environment.

As far as the evolution of an animal is concerned, a species or a breed develops when it is isolated. Most frequently, this isolation is geographic, although it may sometimes be behavioural. This is confirmed by the observations on animal breeds living around Lake Chad.

It therefore seems paradoxical that, in many countries, a clear distinction and a sharp separation are made between livestock breeds and the environment. This situation is the fruit of history, but it cannot be supported any longer. Both domestic and wild animals have an impact on the environment and on human ability to manage it. It is the common evolution of animals, environment and human beings that must be always considered.

Peul/Buduma agreement

December 10, 2002
Kalgama island (Bol), Chad

We leave Bol early in the morning and reach the island of Kalgama after more than four hours of navigation, hindered by a myriad of floating islands; driven by a northeast wind, they force us to change course over and over again. We are going to meet Moussa Bukar, a Peul family head (*Chef de famille*), a herdsman and a nomad: 45 years old, two wives, eight children. We are accompanied by Idriss Issaka, a splendid figure of a man, a breeding extensionist (*Technicien de l'élevage*) at the service of the herders. He tells us the origin of the name Kalgama: it means "Grain island" because as recently as 80 years ago the whole island was cultivated. Now the drought has forced the last of the farmers to abandon these lands; the nomads take advantage of it, driven by the same drought to find new territories. The problem, however, is not that simple: the Peul herds are not comfortable in water. While they are hardy walkers, the Peul zebus swim with some difficulty and the islands can only be reached by swimming. This is where the Buduma poeple come in, expert as they are in the customary transhumance of their Kouri herds from island to island. The agreement provides for "technical assistance" until the new grazing lands are reached.

Moussa Bukar receives us seated with great dignity on the big *natta* woven of dum palm leaves, in the light shade of acacia trees. After the usual polite remarks, there can be but one topic of conversation: the drought, which every year modifies the habits and the itineraries of the nomads. It has been 15 years since they have had to go so deeply among the floating islands, so far from solid ground.

On the islands the pasture is good, but the transfer from one to the other is costly: one must rent pirogues for the members of the family and the household goods, while for the herd, which must swim across, there is always the risk that some of the animals will disappear in the dark waters of the lake. For this task the Peul turn to the more experienced Buduma for help. Today, too, they are ready. We are going to give them concrete assistance by putting at their disposal our large motorized pirogue. In this way we will be able to document the whole enterprise: the transfer from the island of Kalgama to the island of Kafia (which takes its name from a plant that colonized it, the *Maerua crassifolia*, traditionally used as a remedy for pulmonary diseases).

The go ahead for the operation is given. While the females, all of them, from five-year-olds up, work rapidly loading donkeys and zebus with the household goods, the men gather the remaining animals, about 30. In half an hour or so all is ready, and no trace is left of the camp. We are on our way. Soon we arrive at the shore. All the belongings are transferred on to the big pirogue, along with the smaller animals, a few calves and an old donkey loaded and tied like a sack of potatoes. Then it is the turn of the people, especially the young women with their youngest tied on their shoulders. In a short while, with three or four trips, they will all be on the new island. Now it is time to cross with the herd: Moussa Bukar gets into a small canoe with his oldest son, while the other Peul herdsmen drive the reluctant animals into the water. Four Buduma will go alongside the animals, prodding the laggards, guiding the leaders in the right direction. Suddenly there is a great churning of water, a tangling of long horns, a roaring of bellowing animals and goading shouts, a spectacular tumult that we follow with great anxiety: all efforts and hopes are aimed at keeping the animals under control. After about ten minutes, which seem endless, the bulk of the herd arrives on the new land. They stop, disoriented, gasping for breath. Then the horses arrive, a few at a time and, last of all, the donkeys. Some of the exhausted animals are unable to make it ashore. The Peul jump into the water and drag them forcibly on to the land. Now it is all over; silence descends and dissolves the tension. The crossing was quite a feat, but not a single animal was lost.

Chef de famille Moussa Bukar is drenched from head to toe after having floundered in the shallow water near the shore to help the horses, donkeys, cows and calves to reach land.

BUDUMA PEOPLE HELP PEUL HERDERS REACH THE ISLANDS

KALGAMA ISLAND (BOL), CHAD

KALGAMA ISLAND (BOL), CHAD

ABOVE AND BELOW: ZEBU CATTLE ARE HARDY WALKERS BUT SWIM WITH SOME DIFFICULTY. THE JOURNEY IS NOT SO EASY

KALGAMA ISLAND (BOL), CHAD

KALGAMA ISLAND (BOL), CHAD

TRANSHUMANCE IS GENERALLY REGULATED BY PERSONAL AGREEMENT RATHER THAN BY ANY CODE OF LEGISLATION

KALGAMA ISLAND (BOL), CHAD

NOMADS' BELONGINGS ARE VERY BASIC, BECAUSE THEY MUST BE PACKED OR UNPACKED IN A FEW MINUTES

KALGAMA ISLAND (BOL), CHAD

DECISIONS ON HOW, WHERE AND WHEN TO MOVE ARE TAKEN BY THE *CHEF DE FAMILLE*

KALGAMA ISLAND (BOL), CHAD

WOMEN ARE RESPONSIBLE FOR THE WHOLE HOUSEHOLD

Laughing, he tells us, "I was about to die with my eyes full of water . . .", and he seems unwittingly to paraphrase another more famous nomad, Dayak, who wrote, "I was born with my eyes full of sand . . .". Certainly, from the sands of the desert to the waters of the lake is a long distance to cover, mental as well as physical.

Although soaking wet and out of breath like his animals, Moussa Bukar appears to be in high spirits: no losses and a rich new pasture for his herd. We say goodbye with warm handshakes, while all the women, from five-year-olds up, have already set up the new camp: yellow rows of calabashes are neatly piled up on their trestles and the mortars are already at work, with their usual muted and regular rhythm. Tonight, too, there will be curdled milk and millet to eat.

On the way back, in the reddish light of the sunset, we encounter another small group made up of a pirogue with two Peul herdsmen on board and three Buduma in the water, who are driving four recalcitrant zebus. The Buduma swim close to the four animals, prodding them with shouts and blows. It does not seem to be an easy job. Idriss Issaka explains that they are going to Bol for the following morning's market. He adds that the Buduma are usually willing to take the Peul animals across, in those rare instances when the nomads, out of need, decide to sell some of their zebus. To get to the market, they often have to cross five or six islands, with as many stretches of water to swim across. The distance between islands can be as much as a kilometre. For such a service the Buduma usually charge 5 000 CFAF *, (but with two or three trips they might earn as much as a teacher).

By now we are navigating in complete darkness. The moonless night has brought to a close a difficult day full of risks, with Peul and Buduma as protagonists in the arduous but somehow harmonious arrangement between nature and the calm and resolute human will to survive.

* 1 000 CFAF are equivalent to 1,52 euros.