Conservation

BREED CONSERVATION AND MAINTAINING OPTION VALUES

Pastoralists and smallholder farmers maintain animals with traits that may be of no current commercial interest, but potentially have huge value in changed environmental and economic circumstances. In other words, the livestock keepers maintain option values (Pilling *et al.*, 2008; Rodriguez, 2008). Such values may arise because the animals have "survival" characteristics, such as the ability to cope with particular diseases. If the diseases become more widespread or control methods become unsustainable the options values may be realized. Characteristics of this kind can be maintained by keeping the animals in their natural environments, where they are exposed to natural selection pressures. At the same time, the animals are exposed to changing ecological conditions and new diseases that arise in their environment. This has the advantage that animals become adapted to the new challenges, but has the disadvantage that some of the "old" option values may be lost.

Smallholder chickens often have to scavenge for their food rather than rely on daily handouts of concentrate. To survive under such conditions and to defend their chicks, local breeds need to be aggressive and energetic, and have good mothering ability. Examples include Fayoumi chickens from Egypt, whose aggressive high-energy behaviour allows them to survive in difficult conditions (Meyer, 1997), and Nigerian chicken breeds, which are known to fight off predators that try to attack their chicks (Ibrahim and Abdul, 1996; McCorkle *et al.*, 2001).

Pastoralist livestock often retain the ability to defend themselves against predators. Nari cows, for example, defend their calves from leopards by forming a circle around the young animals and shielding them with their extremely long and pointed horns. Nari cattle owners even state that the cows will defend their owners in the same manner if they perceive a threat to them (Köhler-Rollefson *et al.*, 2007).

Pastoralists and smallholder farmers live and use their breeds mostly in the environments where the breeds originated. Continuous exposure to local conditions allows the breeds to maintain the adaptive traits that enable them to cope with the available fodder, the climate and specific environmental features such as stony or swampy ground, or high altitudes.

If removed from their original environments for a number of generations, animals may lose the characteristics that allow them to survive. The North Ronaldsay sheep of the Orkney Islands in Scotland, for example, are adapted to a diet of seaweed. If animals are transferred to other environments, where the diet is different, natural selection eliminates rather than maintains the adaptation that makes the breed unique (Woolliams *et al.*, 2008).

FURTHERING ADAPTIVE TRAITS

Smallholder farmers and pastoralists are known to further the development of adaptive traits through purposive selection. WoDaaBe herders in Niger select their animals for their

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The Bactrian camels of the Gobi desert in Mongolia provide wool, transport, milk and meat

"feeding competence", defined as the ability to select the best season-specific browse or graze, and the ability to negotiate difficult terrain. The capacity to browse includes the ability to reach, choose, ingest and process the highly nutritious forage that their herders lead them to. The WoDaaBe also select their animals for "social competence", in order to minimize stress in interactions within the herd and with the herder (Krätli, 2008).

Other pastoralists keep their livestock in a state that is close to wild. This exposes the animals to continued selection pressure, maintaining their adaptive traits and allowing

BOX 5

Examples of breeding strategies that involve mating domestic animals with wild relatives

- In the Gobi Desert of Mongolia, camel breeders are pleased when their female animals are impregnated by wild camels.
- Farmers in rural areas of Sri Lanka are known to cross-breed domestic animals with wild species, such as the wild boar (*Sus scrofa*) and a species related to the red junglefowl (*Gallus lafayetti*), as a deliberate breeding strategy.
- There are indications that farmers in Viet Nam and Papua New Guinea purposefully cross-breed domestic and wild pig species.
- In the Rann of Kutch in Gujarat, India, donkey owners deliberately provide opportunities for their female donkeys to be covered by male half-asses.

them to adapt to changing conditions. Examples from India include camel breeders in the Thar Desert, Toda buffalo breeders in the Nilgiri Mountains and Pullikulum cattle breeders in Tamil Nadu.

Another strategy adopted by some groups of pastoralists to improve adaptive traits is to purposefully arrange for their female animals to be bred by wild males. Box 5 provides some examples.

ADAPTING BREEDS TO LOCAL CONDITIONS

Livestock keepers make conscious efforts to adapt their animals to new environments and changing conditions (Martin *et al*., 2001). When introducing preferred breeds into new ecological zones, pastoralists may cross-breed their animals with males from breeds local to the new environment in order to enhance their offspring's adaptation to local conditions (Blench, 1999; McCorkle *et al*., 2001; see also the section *Experimenting with breeds*). Herders may also provide extra care to animals at risk (Blench, 1999) to help them cope with the challenges of the new environment.