Biodiversity IN Development

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Livestock and biodiversity

It has been estimated that livestock contribute to the livelihoods of at least 70% of the world's rural poor. However, many livestock breeds are under threat, and the consequent genetic erosion needs to be addressed to ensure that future development options are not closed. In addition, the impact of changing patterns of livestock production on the environment as a whole needs consideration.

Animal domestication began over 12,000 years ago. Of the 40,000 vertebrate species on the earth, 40 were selected as useful by different human cultures and domesticated. Of these, only 14 species account for over 90% of today's global livestock production.

Livestock, livelihoods and development

An estimated 1.96 billion people rely on livestock to supply part or all of their daily needs. Livestock and their products supply at least 30% of human needs for food and agricultural production in the form of meat, milk, milk products, eggs and fibre. About 250 million animals provide draught power for 60% of arable land in the tropics, which is of great importance in Africa and South America, and livestock manure accounts for about 70% of soil fertility inputs in developing countries.

Livestock not only provide smallholders with a source of food but also income. In Mali, for example, 78% of cash income on small-scale mixed (crop/livestock) farms comes from livestock. Moreover, livestock provide a buffer against risk at critical periods, as a readily convertible store of assets. Poor families often choose to maintain a variety of livestock species and breeds to benefit from these multiple benefits.

Global meat production figures show that 54% comes from livestock reared on grasslands, 37% from industrial animal production systems, and 9% from mixed farming systems. Livestock can be successfully reared in arid and semi-arid areas unsuitable for crops, and despite droughts, livestock production has continued to increase in arid lands because pastoralists have been mobile and adapted to making the best use of these dynamic but resilient ecosystems.

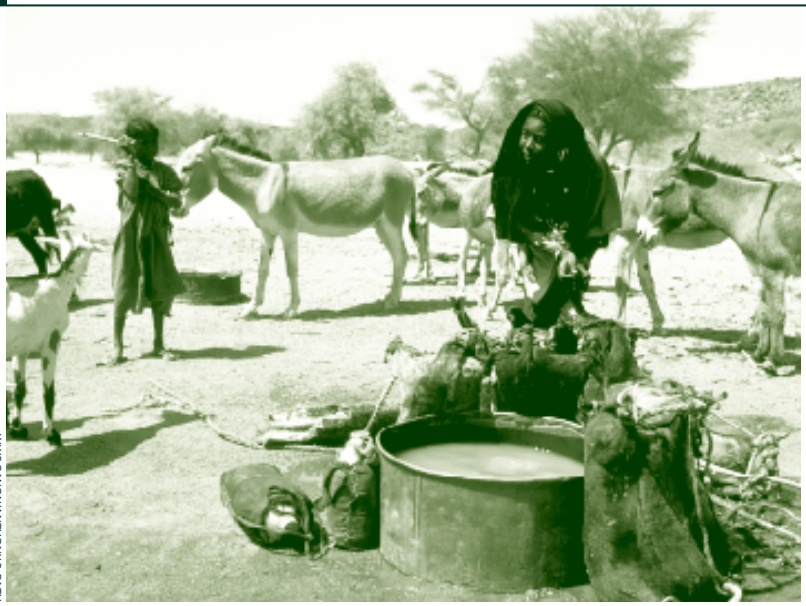
Breeds – what are they?

A breed refers to a group of domestic livestock with definable and identifiable characteristics that distinguish it from other groups within the same species. Differences between breeds account for much of a species' genetic variation, which in turn supports different livelihood needs. Some breeds are adapted to specific local conditions: disease resistance (N'dama cattle in West Africa are tolerant to trypanosomiasis) and drought tolerance (fat-tail sheep, zebu cattle and camels in arid or semi-arid zones); others for special qualities: the Tuareg in Niger breed two types of camel – one for milk and the other for transport.

European Commission

DFID Department for International Development

IUCN The World Conservation Union



WWF-CANON/ANTHONY B. RATH

Livestock are an integral part of many poor peoples' lives, providing meat, milk, blood, hides, draught power and, here, skins for carrying water.

Global trends in livestock production

Significant increased demand for livestock products occurs with expanding urban populations and is predicted to gather momentum in East Africa, Southern Asia and Latin America. This is encouraging industrial production systems, and a shift away from ruminant livestock (ie cattle, sheep and goats) to others (mainly pigs and chickens). Industrial production systems are predicted to provide 70% of food from livestock by 2010.

Already, poultry and pigs can be mass-produced using concentrate feeds, which means that global livestock production will become increasingly dependent upon crop products. 21% of the world's arable land has been given over to livestock feed production without, so far, affecting human food consumption even during low production years. But the trade in concentrate feeds could deplete local food supplies, combined with increasing pollution problems in areas where high concentrations of livestock exist in industrialised production units.

Loss of livestock biodiversity

Of the 14 domesticated species there were 3,831 breeds at the beginning of the 20th century. Of these 618, or 16%, have become extinct, and a further 15% are classified as critical or endangered. This loss is important. The livestock gene pool is small because few wild relatives exist, meaning that losses cannot be compensated for by tapping into other genetic resources.

Livestock genetic erosion is caused by the replacement of the existing domestic breeds with a small selection of specialised 'improved' breeds. This is due not only to substitution, but also to cross-breeding, and the elimination of livestock through changes in production system. Subsidies or incentives to encourage use of certain breeds or production systems have lead to changes in livestock breeding strategies with the loss of local breeds or dilution of their adaptive characteristics.

Once subsidies or incentives are removed, local livestock populations are often not able to recover (see box). An urgent review is needed of what constitute important and useful breeds, with a clear indication of the unique qualities that need to be maintained.

Impacts on the environment

The impact of livestock on grasslands can be positive under optimum conditions:

- grazing can increase the ground layer plant species diversity of rangelands/grasslands;
- low and moderate grazing activity in semi-arid regions increases soil water infiltration.

However, they can also have negative impacts. In semi-arid (more than 90 days growing season) areas, pasture **degradation and soil erosion can result from** trampling and over-grazing where dense livestock populations occur. This is linked with increasing human settlement, and the multiple effects of: increasing crop encroachment on grazing lands, fuel-wood collection, over-stocking of remaining lands and decreased mobility of pastoral herds. In addition, land tenure disputes and incentive policies have undermined traditional sustainable land use practices. This includes fertiliser and feed subsidies, or concentrate feed hand-outs,

The status of breeds within species of domestic livestock worldwide

Species	On FAO database	No. at risk	% at risk
Cattle	787	135	23.1
Chicken	606	274	53.5
Dromedary	50	2	5.0
Duck	62	29	46.8
Goat	351	44	16.5
Pig	353	69	26.0
Sheep	920	119	18.1

Source: Blench 2001.

that are accelerating the degradation through over-stocking.

In densely populated areas such as East Asia, where human and livestock densities are high and livestock markets are accessible, nutrients are imported for industrial livestock production and animal waste exceeds the absorptive capacity of land and water, resulting in biodiversity losses, groundwater contamination, eutrophication of aquatic systems, and soil pollution. In contrast, high livestock numbers associated with intensive smallholder cropping systems in East Africa and Southeast Asia make positive contributions to agricultural sustainability by enhancing soil fertility through the provision of manure, and contributing draught power.

Subsidised large-scale commercial ranching in the 1970s and 1980s has led to the **loss of large areas of forest** through conversion to pastures. It is estimated that 44% of deforestation in Central America is a consequence of ranching in forest frontiers; in the past this was largely due to wealthy land owners, but is increasingly caused by small-holders.

At a global level, livestock activities contribute significant amounts of CO_2, NO_2, and CH_4, all of which are greenhouse gases that accelerate **global warming**.

Opportunities for development cooperation

- Ancient lineages that have evolved different qualities need to be maintained preferably in local areas, but also in research station or zoo flocks/herds, so that the genetic diversity is not lost. High technology options for *ex situ* conservation include frozen semen and embryo banks, or DNA/RNA storage and cloning. However, these rely on technology, secure resource supplies (electricity, liquid nitrogen) and political stability which are often lacking in developing countries.

  There is a lack of information with which to plan *ex situ* conservation programmes, requiring a global plan of action to develop country-based action plans for management of animal genetic resources, including data-gathering and storage, training and capacity building, and technology transfer. This needs to catalogue key characters of livestock breeds.

- There is a need to establish full and active dialogue between local livestock keepers (especially marginalised groups), government agencies, private sector organisations and both national and international research organisations. This should be used to facilitate integration of local needs and indigenous knowledge into *in situ* and *ex situ* conservation efforts. Traditional livestock keepers should be granted protection of their intellectual property in the traditional management of local breeds.

- Consideration must be given to the negative impacts of the promotion of intensive livestock production systems and high performance breeds. The subsidies available for these approaches create artificial economies of scale. Mitigation measures are needed to reduce the impacts of nutrient surpluses and pollution, including biogas centres and manure digesters.

Nguni cattle of South Africa

The Nguni cattle of South Africa are hardy, thrive on poor pastures and are resistant to local diseases. However, in the 1960s and 70s homeland herds were 'up-graded' by cross-breeding with high yield European breeds. A small stock of pure Nguni cattle were conserved in research stations, but farmland populations disappeared. With socio-economic change in the 1990s, the high inputs and veterinary services needed by the cross-bred cattle were no longer available, and they began to die or severely under-produce. The only way small-scale farmers could regain the pure-bred Nguni cattle they had domesticated, was to buy them back from wealthier large-scale ranches. With no government money to do this development cooperation assistance had to provide the funds.

Source: R.Blench 2001.

WWF-CANON/MAURI RAUTKARI

Conversion of forest to rangelands has often been in areas unsuitable for livestock rearing. In Amazonia, for example, up to 50% of all pastures are abandoned because the soil is too poor to support cattle.

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International context

Livestock has received less attention than crop agriculture in international agreements or global plans of action; for example, livestock is incorporated into agriculture in the World Food Summit (1996) statements. As a result, the processes establishing global agreements are less well advanced, although recent multi-lateral reviews of livestock/biodiversity/environment issues have been carried out.

The Global Plan of Action for Management of Farm Animal Genetic Resources (FAO, 1998) focuses on gathering information and setting up national/regional focal points, as the first steps that must be taken to drawing up action plans. The first Intergovernmental Technical Group on Animal Genetic Resources met in September 1998. CBD COP III, IV & V have acknowledged the importance of the Global Strategy for the Management of Farm Animal Genetic Resources.

- In the semi-arid zones where ecosystems are easily degraded, increases in production must be supported by ecologically-sound land practices and policies. In these regions there is also an option to look at co-management of wild animals. For example, a 20% reduction in cattle stocking would allow the full range of African savannah antelopes to co-exist on some cattle rangelands, and in flooded grasslands and swamps of South America, capybaras have been successfully ranched alongside cattle and horses.

- In arid zones it is crucial that traditional livestock management systems that are adaptable, and involve long-range movements of cattle and sheep, are not undermined by fencing and prohibitive policies.

- In higher potential areas where the conventional resource base cannot support further intensification, consideration must be given to more intensive production in mixed farming areas; where ruminant livestock can be grazed in marginal areas not suitable for crops, eat fibrous crop residues and providing the means (through manure) by which nutrients can be rapidly and efficiently recycled to crops.

Further Information

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- reference to other Biodiversity Briefs is denoted as (see BB#).

Website

All Biodiversity Development Project (BDP) documents can be found on the website: http://europa.eu.int/comm/development/sector/environment