Livestock Diversity and Climate Change in Rangelands

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Livestock diversity and climate change in rangelands

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Introduction Domestic animal diversity is critical for food security and rural development . The 40+ domesticated animal species contribute directly and indirectly to 30-40 % of the total value of food and agricultural production . In marginal environments , livestock is often the only means of survival . Today , there are 6536 local breeds reported by only one country , and 1080 transboundary breeds that occur in several countries , many of which are adapted to dry rangelands . Animal genetic diversity allows farmers to select stocks or develop new breeds in response to environmental change , threats of disease , changing market conditions and societal needs . However , animal genetic diversity worldwide is under threat . About 20 % of reported livestock breeds are currently reported as being at risk , and the loss of within-breed diversity is not even known (FAO , 2007a) .

Impact of climate change on livestock production and diversity Livestock producers will have to cope with both , slow climatic changes and more frequent extreme climatic events . It is expected that climate change will affect livestock production and productivity directly and indirectly . Its impact on livestock biodiversity is difficult to assess .

Direct impact Loss of animals through droughts and floods , or disease epidemics related to climate change may increase . If breeds occur only locally , there is a risk of them being lost in localized disasters .

Dry rangelands are some of today's most extreme environments . In the Near East , 90% of all breeds are kept in drylands . In Africa , these are 56% , 42% in Asia and only 19% in Latin America . On average , 46% of the breeds in the four regions are adapted to drylands . The distribution of some domesticated species , such as camelids , is restricted to drylands . More than 70% of the breeds of asses , 30% of horse , around half of sheep and goat and a third of cattle breeds are adapted to drylands . Further selection for breeds with effective thermoregulatory control will be needed to cope with climate change . It may be difficult to combine the desirable traits of adaptation to high temperature environments with high production potential . At higher temperatures , species substitution could be an option . The speed of adaptation will be crucial . If the available breeds cannot be selected fast enough to adapt to climate change , an increased need for movement of breeds which carry the desired traits will occur . This would require that livestock keepers , particularly pastoralists , continue to have access to a wide portfolio of genetics . They also need access to technologies for dealing with climate stress in animal husbandry .

Indirect impact Water , feed and fodder are the most important inputs for livestock production . Their overall and relative availability may be affected by climate change . This may be particularly crucial in rangelands .

Livestock contributes to and will be affected by climate change . Livestock now use 30 % of the earth's entire land surface , mostly permanent pasture but also including 33 % of the global arable land used to producing feed . The sector is crucial for adaptation and mitigation of climate change-because the livestock sector is a large producer of greenhouse gases (GHG) (18 % of GHG emissions as measured in CO_2 equivalent are attributed to livestock , through enteric fermentation , land use and land-use change , and manure management) (FAO , 2006) . Therefore , the various climate change mitigation policies and technologies are expected to influence the livestock sector . Ruminants supporting livelihoods in marginal rangelands or those used for landscape management may be excluded from the GHG discussion , and improved pasture management for CO_2 sequestration should be encouraged .

Conclusions Long-term breed survival depends on the comparative advantage of the breed to provide the desired goods and services in a given environment . The past century has seen a dynamic sector development , and climate change will be one factor in addition to human population and technological advance , with socio-economic and biophysical components interacting at different scales . For the sector to be able to adapt to different scenarios of climate change , the international community must ensure the availability of a wide portfolio of animal genetic resources to livestock keepers and breeders . It must also undertake to facilitate exchange of animal genetic resources for food and agriculture and to promote technology transfer . The recent adoption of the *Global Plan of Action for Animal Genetic Resources* and the *Interlaken Declaration* by the international community provide for the first time an internationally agreed framework to promote creating these crucial conditions for the global livestock sector (FAO , 2007b) .

References

FAO . 2006 . Livestock's long shadow-environmental issues and options , edited by H . Steinfeld , P . Gerber , T . Wassenaar , V . Castel , M . Rosales & C . de Haan . Rome .
FAO . 2007a . The State of the World's Animal Genetic Resources for Food and Agriculture , edited by B . Rischkowsky & D . Pilling . Rome . (*http ://www .fao .org/docrep/010/a1250e/a1250e00 .htm*) .
FAO . 2007b . Report of the International Technical Conference on Animal Genetic Resources for Food and Agriculture , Interlaken , Switzerland , 3-7 September 2007 . ITC-AnGR/07/REP .