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AGRICULTURAL BIOLOGICAL DIVERSITY*Lessons learned from case-studies on animal genetic resources: paper submitted by
the Food and Agriculture Organizations of the United Nations**Note by the Executive Secretary*

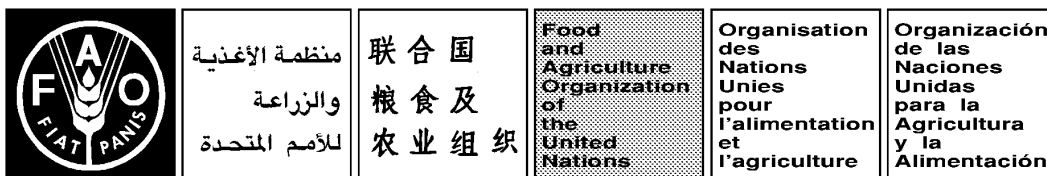
1. The Executive Secretary is circulating herewith, for the information of participants in the seventh meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), a background paper prepared by FAO on lessons learned from case-studies on animal genetic resources. This information note supplements the progress report by the Executive Secretary on the implementation of the programme of work on agrobiodiversity, including the development of the international pollinators initiative (UNEP/CBD/SBSTTA/7/9). As noted in paragraph 21 of that progress report, syntheses of case-studies and analysis of lessons learned are under preparation for various dimension of agricultural biodiversity. As recommended by the liaison group on agricultural biodiversity, which met in January 2001, the present information note has been prepared by FAO to provide a synthesis of lessons learned from case-studies on animal genetic resources.

2. The paper is being circulated in the form and language in which it was submitted to the Secretariat of the Convention on Biological Diversity.

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LESSONS LEARNT FROM CASE STUDIES ON ANIMAL GENETIC RESOURCES

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I. Introduction:

A revolution in animal agriculture is taking place globally, driven by the demand for livestock products and fuelled by population growth, urbanisation, and income growth in some developing countries and increasing poverty and erosion of livelihoods in others. Meat and milk production will need to nearly double over the next 20 years to meet the demand in developing countries. Such rapid growth will have profound implications for the environment and for agricultural production systems. The livestock development trend is towards increased intensification and industrialisation of production systems and the use of increasingly uniform genetic resources. Loss of animal genetic diversity puts in jeopardy the sustainability of animal agriculture and the ability of farmers to respond to changing environmental conditions, such as disease, climate, production systems, as well as future consumer preferences and food security. Unsustainable intensification puts into jeopardy the livelihoods of millions of small farmers, constituting the rural poor.

Long-term food security as supported by the livestock sector is dependant upon production systems, which are used in a sustainable manner, and the sustainable use and conservation of animal genetic resources. A requisite for the sustainable intensification is utilization of the most appropriate animal genetic resources with an understanding of the limitations and opportunities of the production environment in which the animals will be maintained. The use and development of animal genetic resources must be based on a comprehensive understanding of the roles and values of locally adapted breeds, exotic breeds, and crossbreds.

Too often livestock development programmes have taken place without full understanding of local resources, both animal genetic resources and the local ecological conditions. Development has often been directed by outside agencies that do not always fully appreciate local capacity to design and implement livestock development programmes. Consequently, domestic animal genetic resources are eroding and unsustainable livestock development programmes have become all too common. Distorted policy interventions have played a significant role in failed development programmes. For example, subsidised imports of exotic germplasm, or subsidisation of livestock feeds to support enhancement of intensive systems, have led to unsustainable systems, which tend to collapse after the subsidies are removed. There are very few examples of true long-term economic valuation of animal genetic resources, particularly comparing locally adapted and exotic genotypes in the same production systems. Such studies are essential to guide livestock development programmes, and to determine the most appropriate use and development of animal genetic resources within the local production environments. Without such information, policy makers and development agencies lack the basic information they need to ensure their efforts are contributing to sustainable development.

The Food and Agriculture Organization of the United Nations (FAO), informally requested preparation of several case studies to assist in identifying the requirements for establishing sustainable livestock development programmes. A brief description of each case study and lessons learnt from it is presented in this information document.

II. Myth - Crossbreeding and replacement of locally adapted breeds will produce sustained benefits

There are numerous examples where crossbreeding of locally adapted animal breeds with high input, high output exotic breeds has been undertaken without adequate performance evaluation, or understanding of the capacity of local farmers to adapt to the new demands placed on them in order to maintain the higher input crossbreds. Crossbreeding has been often promoted under the assumption that crossbreds would produce greater outputs as a result of the contribution from the exotic breed to productivity, and of the contribution from the local breed environmental adaptation. Several of the commissioned case studies indicate that crossbreeding involving exotic germplasm has rarely lived up to these expectations, and that experimental scale projects are necessary to properly assess crossbreds within the local production environments.

In India, the Vechur, a small cattle breed was historically popular, as milk production in this breed is relatively high compared to other local breeds (case study 1). The Government of Kerala adopted a crossbreeding policy around 1960, under an Indo-Swiss Initiative. The goal was to improve the financial conditions of farmers. As a result of this initiative, about two-thirds of the cattle population in the State was converted to crossbreds, with the Vechur cattle reaching near extinction.

The crossbred cattle produced double the milk produced by the Vechur cattle. However, to achieve this level of production, inputs also had to be significantly increased. The Vechur breed can be maintained on wastes from plantation crops that are available free to farmers. Also, primary health care and disease prevention costs rose for the less adapted crossbred animals, and tended to exceed the financial capability of small-scale marginal farmers.

Farmers and researchers began to recognize the important role that the locally adapted Vechur cattle breed could play in sustaining the livelihoods of small-scale farmers, and initiated a conservation strategy. The project required researchers and farmers to work together to improve the performance of the Vechur breed by integrating modern breeding practices with traditional farming approaches. The result of the project is the re-establishment of the Vechur breed.

Another example of exaggerated expectation of crossbreeding is a goat development programme in Ethiopia (case study 2). Crossbreeding has been promoted based on the hypothesis that crossbreds are more productive and hence more beneficial under improved management than indigenous goats. A Dairy Goat Development Programme involving crossbreeding was implemented between 1989 and 1997. A year after the programme finished, a comprehensive evaluation of improvements in goat productivity was undertaken. Based on the multiple utility of goats as well as multiple resources employed, broader productivity criteria were developed and applied to evaluate goat production. The results showed that crossbred goats did not generate higher benefits than the indigenous goats.

It was shown that it was possible to significantly increase the overall contribution of indigenous goats to subsistence producers through improved management practices, without introducing crossbreds. The greater net benefits from indigenous goats were brought about by healthier herds, consequently lower mortality and thus higher net weight gains and higher productivity on a herd basis. The improved management was maintained without the introduction of crossbred stock, which challenges the argument that the crossbreds provide

the incentive to improvements in the level of management. This also challenges the prevailing opinion in Ethiopia that indigenous goats do not adequately respond to improvements in the level of care compared to crossbred goats, a judgment which in the past has been based on incomplete evaluation of productivity. The case for the utilization of crossbred goats was further weakened by the practicalities of maintaining an appropriate breeding programme. Crossbreeding was therefore found to be inappropriate for subsistence producers.

In Brazil, the Pantaneiro horse has been an important breed for hundreds of years making possible ranching in an area that is very difficult to navigate without an experienced horse that is well adapted to local environmental conditions (case study 3). For at least six months per year, the Pantanal is almost completely flooded. The majority of the horse breeds existing in Brazil are not adapted to these extreme conditions.

During the 20th Century, other horse breeds, believed to be of higher value, began to arrive in the Pantanal area, which resulted in the decline of the Pantaneiro horse largely as a result of indiscriminate crossbreeding. Ranchers working with researchers began to notice that the Pantaneiro horse is tolerant to equine infectious anemia, which is extremely valuable as this disease impacts heavily on equine livestock in the Pantanal region. Although Pantaneiro horses can become infected, they rarely show the clinical symptoms of the disease and continue working like any healthy horse. Understanding of resistance to equine infectious anemia has provided a strong incentive to maintain the Pantaneiro horse, and a conservation programme is now well underway.

Lessons learnt:

- An important lesson learnt from these case studies is that there should **not** be an assumed benefit from crossbreeding locally adapted breeds with high input, high output exotic breeds, or replacement of locally adapted breed with high input, high output breeds. All livestock development programmes must consider the most appropriate breed improvement strategy for local conditions through testing and evaluation to determine overall benefits to farmers and local communities. The case studies demonstrate that it is essential that the potential to develop indigenous breeds be carefully evaluated prior to introduction of exotic germplasm.
- Performance evaluation of breeds must occur within the local production environment on an experimental scale to ensure that the introduced or crossbred animals are suited to local conditions, both in terms of meeting their input requirements and their ability to perform in the local and often stressful environment. Over centuries, livestock have become adapted to local conditions, (climate, disease, drought, flooding, etc.). The benefits of adaptation of local breeds have not been fully appreciated or understood in the design of many livestock breeding programmes. While crossbreeding may in the short term enhance outputs, over the long term, crossbreeding may not be sustainable, or provide sustained benefits. In some instances, crossbreds will not reproduce regularly, or even survive in the local production environment.
- Modern breeding strategies and management practices can be integrated with traditional farming practices to improve the performance of locally adapted breeds. The case studies illustrate that in many cases, improving performance of locally adapted breeds will produce sustainable benefits, and that this approach will often produce more sustained benefits than strategies involving replacement or crossing with exotic breeds.

III. Myth - All production environments are alike

While no one in the livestock management field would suggest that all production environments are alike, all too often policies and programmes for animal genetic resources have been prepared and implemented as if they were. Exotic animal genetic resources have been introduced to production system without adequate understanding of the requirements for their long-term sustainability. Policies and programmes have repeatedly resulted in the decline or loss of locally adapted breeds, narrowing the agricultural genetic resource base.

The lesson from the following case studies indicate that it is essential that livestock development programmes become more advanced, and can not be based on increasing/improving a single or few isolated outputs. They must consider the potential and values of both indigenous and exotic breeds, in planning developments. Understanding of local production systems is crucial, as is understanding of social and cultural values of the communities where the development is being planned. Breeding projects must also be planned with an understanding of the different roles played by women, children, and men in the management of livestock.

In South Africa, European colonization and the subsequent acceptance of the colonial farmer as a role model led to the introduction of exotic breeds that eventually diluted and depleted the original gene pool of indigenous livestock (case study 4). The colonists often regarded the cattle owned by the Nguni people as inferior, as they appeared to perform poorly, and were less uniform in color and color patterns, which gave the breed the appearance of an indiscriminate mixture of breeds. This perception of inferiority was adopted by the Nguni people who viewed the high input, highly productive exotic breeds as superior to their own, and adopted the colonists' farming practices as their model. The fact that the Nguni cattle were able to survive with minimal care was of secondary importance to commercial farmers as supplementary feeding and stock remedies were relatively inexpensive.

The perception of inferiority of local breeds led to the promulgation of an Act in 1934 in which populations of indigenous breeds and types were regarded as scrub (nondescript). Inspectors were empowered to inspect bulls in communal areas and to castrate them if they regarded them as inferior. Fortunately the Act was only applied effectively during the first few years of its existence, as it proved unpopular with stockowners. It was only recently that scientific evidence showed that Nguni cattle performed well under the prevailing low-input management practices of communal systems whilst the exotics performed poorly. The Nguni cattle breed is now seen as appropriate to the management style and needs of the emergent farmer, who requires a relatively low maintenance and relatively high output animal. In 1985, a committee was appointed to report on the desirability of having an *in vitro* germplasm bank for indigenous livestock, and to examine the need for controlling movement of exotic germplasm into South Africa.

Livestock keeping is seen as central to Campesino agriculture in Southeast Mexico in terms of nutrient recycling and the diversification of income sources, as well as for savings, insurance, risk management, asset accumulation, diversification, protein consumption, and to maintain social customs (case study 5). Pig keeping is particularly important. Socio-economic studies have revealed Campesino preferences for the Box Keken pig breed. It is favoured for its relatively low maintenance costs, adaptive traits, and meat quality. Over the last 30 years the Box Keken has suffered dramatic declines in effective population size, mainly due to

displacement by imported breeds or crossbreeding with exotic breeds. Imported breeds have been promoted by Government agencies, and low feed prices have led temporarily to conditions that have favoured rearing of imported pigs. The result is that Box Keken now exist only in isolated inbred groups, and as a component of disperse crossbred populations.

An experimental agroecosystem approach with the participation of farmer communities was used to understand the constraints and opportunities of Campesino agriculture. The project considered the genetic resources presently used in agricultural production, and the plants and trees available in the secondary vegetation that could be considered as livestock feed resources. Emphasis was placed on the sustainable utilization of local genetic resources – maize varieties, local legumes, indigenous turkeys, and criollo poultry and pigs.

The main limiting factor to pig keeping by marginalised Campesino families is their production of maize grain. Maize is both the people's staple food and the main feed for pigs. To address this, innovations in staple crop production were undertaken to increase the production of maize grain, legume grain and legume forage to enable the establishment of a small Box Keken breeding nucleus group. In the Mayan communities, small Box Keken nucleus groups have now been managed successfully for four years, and have provided piglets to households. Access to the piglets reared in the collectively managed nucleus has decreased the vulnerability of poor families.

Manure incorporation and the use of legume cover crops have contributed to increases in maize productivity. In this way, the area of forest cleared for maize production is reduced. Animal husbandry has also changed by incorporating by-products of maize/legume production and the use of high quality forage plants from secondary vegetation which were selected based on traditional knowledge. Taking a broader ecosystem based development approach using indigenous pigs and locally available inputs has thus proven very successful.

A study from Norway indicates that because environments for livestock are different, breeding strategies must consider selection traits important for animal adaptation to this variation (case study 6). In the 1960s and early 1970s, the Norwegian Dairy Cattle improvement programme was focused mainly on increasing milk yield, without considering consequences of such a narrow selection approach. Since about 1974, a broader range of selection criteria has been applied. The breeding strategy now considers secondary traits, in addition to individual milk performance. The result has been improved animal health and production with reduced incidence of some diseases, a reduction in calving problems, and fewer stillborns.

Lessons Learnt

- Government policies may have unintended consequences and reduce sustainability of animal genetic improvement efforts if they are not carefully designed to consider genotype x environment interactions and farmers' capabilities to manage them.
- A broad participatory ecosystems approach in designing animal genetic resources development programmes is advisable to strengthen production systems, e.g. in terms of efficient nutrient cycling and energy use in the crop-animal interaction on-farm.

- Animal resources development strategies will have the greatest impact when there is community involvement integrating traditional practices, knowledge, and innovations with modern livestock breeding and management practices.
- In animal resource development efforts in which primarily small animals are the target, gender-sensitive methodology is required if genuine livelihood improvements are to be achieved, given that these species are predominantly associated with women farmers.
- As small animals in traditional farming are not only strongly associated with women farmers but also with the poor and often with both at the same time, gender- and poverty-sensitive approaches are essential for enhancing the opportunities of animal agriculture to contribute to poverty alleviation; the use of locally available resources and the reliance on indigenous services are thereby priorities.
- Innovations in subsistence agriculture must be developed and tested to ensure that they produce sustainable benefits. Better methods for the economic valuation of animal genetic resources, including their social and environmental externalities, in local production environments will be of particular benefit.

IV. Myth - Animal Genetic Resources conservation initiatives are always costly public sector programmes

Conservation programmes for animal genetic resources have been often seen as costly adventures that must be undertaken through public sector funding projects. The case studies reveal that animal genetic resources conservation programmes can be sustained within the private and informal sectors, and demonstrate that awareness among farmers and breeders of the status of local breeds and the consequences of their loss, can lead to an effective response.

In France, the Breton Black Pied, an historically important cattle breed, had almost become extinct by the 1970s (case study 7). A collaborative conservation programme was established involving 46 voluntary farm families and breeders. Community involvement was essential to bring together producers and consumers. The result is a sustainable breed conservation programme that has been achieved through commercialisation of quality products, and other ventures, such as tourism. The breed is being further developed within the local production environment to ensure its long-term sustainability.

In Brazil, cost effective conservation programmes for animal genetic resources have been established by increasing awareness of the roles and values of locally adapted breeds, and through collaboration among researchers, breeders and ranchers. In the case of the Pantaneiro Horse, a Pantaneiro Horse Breeders Association was formed, uniting breeders, as well as organizing and maintaining genealogical records (studbook; case study 3). The Pantanal Agricultural Research Centre, together with the National Research Centre for Genetic Resources and Biotechnology - Cenargen, both from Embrapa (Brazilian Agricultural Research Corporation) established a conservation nucleus at the Nhumirim Experimental Farm, which is located in the Pantanal region. This serves to support conservation in the local community and promotes awareness of, and participation in the Pantaneiro horse conservation programme.

In the 1960s, the population of Hungarian Grey Cattle breed was about 180 cows and six bulls (case study 8). A conservation programme was launched and now the breed is no longer

endangered. The programme was successful thanks to the enthusiasm and pride of the breeders in keeping this noble breed as an important cultural asset for Hungary. Early in the programme, government subsidies were provided to breeders and farmers. Now the Hungarian Grey is sustained as a commercial beef breed.

The White Park Cattle breed in Britain was reduced to 65 cows and 4 bulls by 1970 (case study 8). To prevent its extinction, an active development programme was initiated, and now the population size has increased to more than 750 cows worldwide. White Park Cattle is a specialized beef breed, which thrives in low-input, non-intensive systems of production. They are valued for their high quality beef, easy calving and production efficiency. Their successful conservation is largely due to the premium beef market price they command. The conservation of the White Park Cattle breed is an excellent example of conservation within the commercial system, illustrating how niche markets can be established by taking advantage of genetic diversity and the resulting diverse products, which can be further enhanced through breed development.

In Lesotho, efforts are underway to conserve the Basotho Pony (case study 9). This is an indigenous breed that is highly adapted to local conditions. Horses are extremely important assets in some areas of Lesotho, providing the primary mode of transportation over rugged terrain. They are also used for trekking by tourists providing an important source of income. In some parts of the country horses are used as draught animals for cultivation, planting, and transport of goods. Horses are also important cultural resources in Lesotho, as there is great pride in maintaining horses, and in being a competent rider.

Like in many countries, the value of the horses has declined in Lesotho, largely as a result of a perception that they do not have a role in development and modernization. Basotho Ponies were not regarded as marketable commodities in the same way as cattle, sheep, and goats were. There was no central marketing strategy, and both breeding and trade were unregulated. As a result, commercial exploitation of the Basotho Pony was not seen as a development opportunity, and the population of this indigenous breed was in sharp decline.

A few interested individuals saw that there was potential for commercial exploitation of the Basotho Pony and initiated a conservation and sustainable use project. A marketing and trekking center has been established to promote conservation through enhanced use and commercialization. The strategy is to develop and maintain the horse's characteristics that enable it to survive in the harsh local environment and make it suitable for trekking (endurance, sure footedness, thick walled hooves, docile temperament, and intelligence). The Basotho Pony will also be promoted as an efficient mode of transportation for the rural population, and marketed in export markets. A breeding society has been established, which will ensure continued community and breeder involvement in the conservation and commercialization of the Basotho Pony.

For a long time, animal production in Vietnam was based on the utilization of local genotypes (case study 10). In recent decades, crossbreeding and replacement of local breeds with imported breeds has been undertaken to increase livestock performance. This has led to severe declines in the use of indigenous breeds. Vietnam's indigenous breeds are well adapted to input-extensive production systems and are extremely important resources for the generally resource poor farmers that are mainly located in remote areas. There is a growing recognition that maintaining local breeds is not only important for remote resource poor farmers; their

conservation is regarded as national insurance policy, because locally adapted genetic resources could become future assets in livestock breeding programmes.

To prevent the extinction of indigenous breeds, the *National Programme on Conservation of the Vietnamese Animal Genetic Resources* was founded under the direction of the National Institute of Animal Husbandry (NIAH). Special programmes are being initiated for the conservation of specific domestic animal breeds. In contrast to many conservation programmes in other countries, most of the conservation programmes implemented by NIAH are conducted on farms, with intensive farmer participation. One of these programmes aims at the conservation of the I-pig by improving its performance to enhance the economic situation of resource-poor farmers. The I-pig project is providing valuable experience that will be applied to another conservation project involving the Meo-pig.

Lessons learnt:

- Animal genetic resources conservation programmes can be extremely cost effective when local farmers, breeders and researchers collaborate, reducing the demand for public financing.
- Public sector funding may be necessary to initiate some conservation programmes. However, the case studies illustrate that successful conservation project can be initiated and sustained within the private and informal sectors.
- While conservation of indigenous breeds can be justified to maintain them for future use and development, subsidized public conservation programmes can become commercially viable provided that there is collaboration among producers and consumers.
- To be sustainable, conservation projects should attempt to obtain economic sustainability by exploiting the unique characteristics of breeds. This may require marketing and development of niche markets.
- Establishment of breed societies can significantly increase public awareness of the important roles and values of locally adapted breeds, and promote community involvement in conservation projects.
- Individual and community involvement in conservation may be motivated by non-monetary factors, including cultural values and national pride.

V. Community Based Management of Animal Genetic Resources

The following case studies present strong evidence that animal genetic resources development programmes will be most successful in many countries by utilizing a community based management approach. Mechanisms for involvement in community based management programmes are variable; however, recurring element is the need to empower local communities and capacity building.

Kathekani is a dryland farming area in Eastern Kenya (case study 11). Commonly reared types of livestock are cattle, goats, sheep, and chickens. The East African Goat is the breed traditionally kept by this community. However, other breeds such as the Galla Goat are also used. Goats are very important culturally to the Akamba community of Kathekani. White

goats are used as dowry payments and for sacrifices to the gods. Black goats are used as payment to witchdoctors. Goat meat is often used to mark an important social event. Goats are a symbol of wealth, earning farmers prestige and respect.

A community based livestock management programme was initiated to exploit the characteristic values of two indigenous goat breeds, the East African Goat and the Galla Goat. The goal of the programme was to use both breeds to improve the livelihoods of the Kathekani farmers and enhance food security. The programme was designed to build on the strong local community capacity to manage livestock production and to exploit the available gene pool to achieve higher productivity. Cultural factors were also considered.

The East African goat is one of the most successful domestic stocks and is more tolerant to trypanosomosis, internal parasites, and pasteurellosis than the Galla. The Galla is kept for its higher body weight and milk yield, compared to the East African goat. To take advantage of the different characteristic of both goats, a community based breeding programme was established. The breeding programme is communally controlled through formation of groups, which establish breeding and improvement goals. The results are positive: The Galla/East African crosses are attaining much higher market weights in a shorter period as compared to the East African goat. Also, crossbreds are preferred for their large carcass size by butchers and traders.

The project has demonstrated the benefits of community based management practices. Stronger linkages among farmers and among other community members have resulted in farmers being in a better position to network and access information they require, to meet their livestock production needs. Farmers are in control of the programme, which maintains their participation and promotes others to be involved. The breeding programme is successful as it has been developed as an integrated livestock production package, not as an isolated project, and organized community activities have led to faster realization of the development objectives.

In Malawi rural poultry constitutes over 80 % of the total poultry population, and are raised and utilised by about 80 % of subsistence farmers (case study 12). Different poultry species are raised, mostly indigenous to the locality except for chickens where traces of the Black Australorp breed have been identified.

Despite the importance of rural poultry, little attention has been given to improving their management, productivity and diversity. Several constraints such as Newcastle disease, predation, poor housing, feeding and mating systems have been identified.

A community based project on improving and sustaining food self-sufficiency through promoting integration, multiplication and intensified utilisation of diversity of rural poultry has just started in villages of the Mkwinda and Mitundu Extension Planning Areas (EPA), Lilongwe Agricultural Development Division. These villages surround Bunda College of Agriculture. The project aims to operate through open nucleus breeding centers established in rural communities and managed by a committee of farmers. This project is designed to promote breeding of a diversity of poultry species in the rural areas and improving management practices. The project concentrates on indigenous species of chickens, pigeons and ducks. The goal is to improve productivity of meat and egg supply and sustain diversification within flocks utilising the existing free-range production system. All management and performance evaluation decisions are taken and implemented by the community and supporting research has full farmer participation. Farmers from within the

community will multiply and distribute breed stock to other farmers. Distribution will be through the traditional stock sharing system.

In Côte d'Ivoire, the indigenous Djallonké breed of sheep is being used in a community-based livestock improvement and conservation initiative (case study 13). The Djallonké sheep live and reproduce in the tse-tse infested zones of tropical humid and sub-humid ecological environments. The emphasis of the programme is on sheep improvement involving smallholder farms through an open nucleus breeding scheme.

All the farmers involved in the project breed only Djallonké sheep. A total of 209 Djallonké farms are participating, with each farm keeping at least 150 breeding Djallonké ewes. Farmers contribute to the programme by selling their selected rams and offering their farms for field training to promote other farmers to become involved. Farmers in the base population use the selected rams from the nucleus for mating. In return, ram lambs born on their farms are sold for evaluation to become part of the nucleus flock. The sale of ram lambs provides significant revenue to farmers.

The desire of the farmers, most of whom are smallholders, to move from traditional husbandry practices to new improved management techniques has been the major factor that has kept the programme going. In addition, extension officers have worked closely with participating farmers providing technical and some financial support. The programme has shown that raising Djallonké sheep may be a profitable enterprise also in the absence of subsidised services. The community-based approach has encouraged other farmers to participate in sheep farming and proven to be a successful method of delivering livestock extension services.

In Poland, community involvement is essential to managing the Biebrza National Park, integrating nature conservation and agriculture objectives (case study 14). The Biebrza basin is an extensive swampy depression, which is the largest and the most natural complex of marshes and peat bogs in Central Europe. The area is supporting a diverse range of flora and fauna, including several endangered species.

In addition to being an important biodiversity reserve, the park area supports about 5,000 farms and five villages. Traditional farming practices are most common with minimal use of external inputs. Park resource managers are working with farmers to ensure that farming and biodiversity conservation are compatible. The objective is to maintain and enhance the biodiversity of farmland and develop new values on farms resulting from the natural characteristics of the area. Farmers have agreed to a number of management practices that are aimed at conserving biodiversity. Some of the commitments include no cultivation of grasslands, delayed time of haying and grazing to maintain nesting habitat for birds, using bird protecting apparatus in front of tractors, and protecting water resources. Farmers are compensated for participating in some conservation programmes.

Lessons Learnt:

- Community based management is an effective way to establish and sustain animal breeding programmes as the community approach develops a sense of ownership among farmers and other members of the community, and also generates transparency and thereby encourages accountability.

- Community based management is an excellent way to ensure that livestock development programmes consider local community social and cultural needs, in addition to striving toward agriculture production goals. Community based management also helps to ensure that traditional knowledge and innovations are respected and integrated with modern management approaches.
- There are many factors to consider in the design of community-based livestock breeding programmes. The case studies illustrated that: farmers are highly motivated when they have a financial stake in the project; communication among all members of the community and outside agencies is essential throughout the course of the project; outside assistance is most effective when it strengthens community institutions; community capacity to run projects can be enhanced through training; and incentives can be very effective in initiating the introduction of new breeding and management practices.
- Establishing demonstration farms and linking farmers within and among regions is an extremely effective way to promote integration of modern breeding methods with traditional farming approaches. Training helps farmers to view genetic resource improvement and conservation activities as business ventures.
- Improved breeding strategies and development of business skills are effective in improving livelihoods of resource poor farm families.
- Community and farmer monitoring of the results of breeding programmes are essential to measure success and achieve understanding among community members of any required adjustments.

Case Study 1.

Conservation of Vechur Cattle

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Country or Region:

India

Main Theme:

Breed evaluation must occur within the production environment. Research can assist in applying modern husbandry and breeding practices to improve locally adapted breeds. Transparent and community driven programmes increase the likelihood of success.

Case Study 2.

Crossbreeding does not lead to greater contribution of goats to household welfare, but improved management does

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Country or Region:

Ethiopia

Main Theme:

Comparison of Somali goats and its crossbreds kept under the same conditions showed the greater net benefit from indigenous goats. Crossbreeding was found as inappropriate for subsistence producers.

Case Study 3.

Conservation of Pantaneiro horse in Brazil

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Country or Region:

Brazil

Main Theme:

Conservation programme for the Pantaneiro horse – a breed well adapted to difficult bioclimatic conditions of Pantanal and resistant to Equine Infectious Anemia. Joint conservation efforts of research institution and breeders.

Case Study 4.

The Nguni: a case study

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Country or Region:

South Africa

Main Theme:

Recognition of adaptive fitness (tick tolerance, low feed requirements, walking ability, tolerance to extreme temperature) led to the conservation and re-introduction of pure Nguni to local rural communities. Project based on participatory approach.

Case Study 5.

Case study: Campesino innovations for the sustainable utilisation of plant and animal genetic resources in southeast Mexico.

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Country or Region:

Mexico

Main Theme:

Box-Keken pig conservation strategy based on ecosystem approach – emphasis placed on utilisation of natural genetic resources. Economic valuation of Box-Keken pigs – subsistence and sale, and non-income livelihood functions like insurance, seasonal buffering, saving and accumulation.

Case Study 6.

Alternative selection of dairy cattle with Norwegian Cattle as example

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Country or Region:
Norway

Main Theme:
Successful breeding programme based on
understanding of the need to broaden breeding
objectives, and include functional traits such as
fertility and health.

Case Study 7.

The Breton Black Pied conservation programme

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Country or Region:
France

Main Theme:
Conservation of local breeds can be achieved
through sustainable use and market development.
The role and support of breeders and farmers is
essential to achieve conservation objectives.

Case Study 8.

The Conservation of Breeds by Name or Types?

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Country or Region:
Great Britain and Hungary

Main Theme:
Sustaining conservation programmes through the
establishment of a niche markets.

Case Study 9.

The state of Bashoto Pony in Lesotho

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Country or Region:
Lesotho

Main Theme:
Re-establishment of the Bashoto Pony.
Development of breeding programme with
establishment of Marketing Centre and Basotho
Pony Association.

Case Study 10.

Characterisation of a model for conservation of
autochthonous pig breeds on smallholder farms in
North Vietnam

Author(s):
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Country or Region:
Vietnam

Main Theme:
Conservation of I-pig within the National
Programme on Conservation of Vietnamese Animal
Genetic Resources, and lessons learnt to improve
further conservation efforts in Vietnam.

Case Study 11.

Community initiatives in livestock improvement: A
case from Kathekani, Kenya

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Country or Region:
Kenya

Main Theme:
Group breeding programme based on utilisation of
local animal gene pool (East African goat and
Galla). Community based approach with agreed
rules, shared responsibilities and transparency in
decision making process.

Case Study 12.

Community based promotion of rural poultry diversity, management, utilisation and research in Malawi.

Author(s):

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Country or Region:

Malawi

Main Theme:

Initiative of Bunda College of Agriculture to improve food self-sufficiency of resource poor farmers. Breeding and management of indigenous poultry based on traditional farming and a stock sharing system.

Case Study 13.

Community based livestock improvement and conservation: experiences from open nucleus breeding programme in West Africa

Author(s):

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Country or Region:

Côte d'Ivoire

Main Theme:

Djallonké sheep community programme led to the conservation and development of a unique breed that can tolerate trypanosomiasis and survive in humid and sub-humid environments. Success of the programme based on desire of small farmers to improve management practices and benefit from extension services.

Case Study 14.

Agro-environmental programmes in the Valley of Biebrza River and in the Biebrza National Park

Author(s):

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Country or Region:

Poland

Main Theme:

Development of agro-environmental programmes to ensure harmony between the need to preserve unique nature values of Biebrza National Park and the need to sustain agricultural activities of local farmers.