

Strategies for management of animal genetic resources in Uganda

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Abstract

Uganda has 6.3, 6.8, 1.1, 1.7 and 32.6 million cattle, goats, sheep, pigs and poultry, respectively (MAAIF, 2002). Livestock are a major component of the agricultural GDP, contributing 17% (MAAIF, 2002). Livestock are a major source of income and security for a large number of resource-poor households. The 23% of the world's population living in developed countries consume three to four times the meat and fish and five to six times the milk per capita as those in developing countries (Delgado *et al.* 1998). The annual growth rate of production through 2020 is projected to be 0.7% or less for each of the major livestock food commodities other than poultry in developed countries and 2.7% for meat, and 3.2% of milk in developing countries. The larger share of livestock production will take place in developing countries, even though per capita production level will be much higher in the developed countries (Delgado *et al.* 1999). The projected increased demand for livestock and livestock products in the developing world calls for the development of strategies of prudent management of animal genetic resources and for a strong and dynamic research system to develop and disseminate technologies that will sustain the increased demand. This paper presents strategies, which, if implemented in the manner suggested, will help manage the animal genetic resources in Uganda in a sustainable manner. It highlights the need for management of the natural resource base, for establishing inventories and characterizing the animals, creation of awareness, the need for a national breeding programme supported by the existing livestock breeding policy, institution of a strong herd recording system, formation of farmer breeder associations to ensure ownership and sustainability, the need for more research in livestock breeding, strategic disease control and networking between researchers and farmer breeder associations.

Keywords: Breeding, genetic resources, livestock, Uganda

Introduction

In Uganda, the agricultural sector consists of crops, livestock and fisheries production. Most of Uganda's population of 25 million people is supported by agriculture, which is the main economic activity and is likely to remain so in the foreseeable future. According to the 2002 figures from the Ministry of Finance and Economic Planning, the agricultural sector accounted for 39.8% of the national Gross Domestic Product (GDP); 40% of the total government revenue; 90% of the country's export and employed 80-85% of the working population.

The livestock sub-sector in Uganda is dominated by mixed farming smallholders and pastoralists who own over 90% of the cattle and almost all the small ruminants and poultry. It is this group of farmers who produce the bulk of the milk and meat for commercial and domestic consumption. It is estimated that during the year 2002, the farm animal genetic resources (AnGR) of major economic value comprised 6.3 million cattle, 6.8 million goats, 1.1 million sheep, 1.7 million pigs and 32.6 million poultry (MAAIF, 2002). Other species included rabbits, horses, donkeys, camels and domestic buffaloes which are currently of less importance in the contribution to food and agriculture given their low volume/biomass.

The AnGR in Uganda contribute about 9% of the national GDP and about 17% of the agricultural GDP. Figures 1 and 2 shows the livestock and poultry population trends from 1984 to 2002

Livestock revolution

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The projected increased demand for livestock and livestock products in the developing world calls for the development of strategies for prudent management of AnGR and for a strong and dynamic research system to develop and discriminate technologies that will sustain the increased demand.

Livestock Production Systems in Uganda

Low input production system

This system is characterized by little or no modification of the production environment resulting into low rates of survival, reproduction and effectively low output. The system accounts for the production of most of the locally adapted breeds of all species important for food and agriculture in Uganda. Notably, these breeds are low

producers and productivity is further encumbered by disease, parasite and nutritional environment stresses such as trypanosomosis, tick borne and viral diseases (affecting mostly the young) in cattle; New Castle Disease and helminthiasis in free-range poultry; helminthiasis and African Swine Fever in scavenging pigs. Standard nutritional and management practices including the keeping of production and breeding records are hardly practiced.

By virtue of the numbers, the AnGR under this system support agro-based industries such as the leather and tanning, milk and meat processing. Furthermore, the major cultural/ traditional use of AnGR in Uganda is under this production system. The AnGR provide food, draught power, hides, manure, social functions and financial security.

Medium input production system

In this production system, there is an increased human intervention in form of input necessary for improved productivity and general management of animals. In the peri-urban areas in Uganda this is the main production system for all AnGR for food and agriculture. Constraints are basically land and labour availability. However, marketing opportunities and readily available veterinary and animal production extension services tend to dictate changes from the low input to the medium input and high input systems.

The primary production in this system is semi-intensive. It includes different sizes of paddocking, housing during part of the day especially at night, and supplementation in feeding. The system is used mainly for production of recently introduced breeds of AnGR.

High input production system

In this system, farmers ensure high levels of animal survival, reproduction and output. This is the production system used for most of the recently introduced, continually imported and exotic breeds of AnGR. It is characterized by intensification and specialization. On farm processing is supported by this system. This high input system also supports animal feed industry in the country and utilizes agro- industrial by-products

Production and consumer trends

Production in ASARECA member countries between 1994 and 2002 grew at average annual rates of 3.6% for beef and only 1% for dairy milk (FAO, 2002). The growth in production has however, not met increasing demand forcing the countries of the region to rely on imports. The increasing human population is expected to worsen the situation unless appropriate technologies to increase market oriented livestock production are forthcoming. Table 1 gives the estimated production and average growth rates for the period 1994-2002.

Demand for Livestock products is rapidly growing worldwide as human population pressure and incomes increase. Land use and human population pressures are

leading to intensification and expansion in many livestock production systems thus increasing stress on the resource base. Expansion of cropping land into drier areas is forcing pastoral livestock production systems to relocate to still more arid lands.

Rising imports of milk and dairy products are a large drain on the balance of terms of trade already weakened by declines in export revenue. Dairy sector models from the developed world have hampered dairy development in poor countries. High costs of modern milk collection methods and use of expensive packaging has made dairy products inaccessible to a large section of the population. Safe collection and transportation methods, and processing technologies improve the quality and shelf life of milk thereby increasing food safety. Many technologies exist depending on local conditions that have not been exploited due to lack of know-how and appropriate means of milk preservation and finding profitable outlets. On the other hand, the traditional method of drying meat with or without salt is a widely used preservation method in Africa. With certain improvements, this technique can generate considerable gains in value added, while products remain affordable to the larger population.

Current State of AnGR in Uganda

In Uganda, livestock production is estimated at 107,000 tons of beef, 1,000,000 tons of cow milk, 41,000 tons of goat milk, 17,000 tons of goat meat, 9,700 tons of mutton/ lamb, 18,000 tons of poultry meat and limited amounts from various other animals. The egg production was estimated at 21,000 tons. 6,778,080 kg of hide were registered while 927,000 kg of goat skin and 206,600 kg of sheep skin were recorded during 2002 (MAAIF, 2003).

Per capita meat and milk consumption is estimated as 6kg and 40 litres per year. The livestock sub-sector and most livestock farmers in Uganda have suffered huge stock losses over the years from civil strifes and instability, theft and cattle rustling.

Cattle

It is estimated that over 90% of the national herd is owned by mixed farming smallholders and pastoralists. The indigenous cattle breed types play a very important role in the lives of many rural Ugandan farming communities. These breeds traditionally provide a number of food commodities, draught power, clothing/bedding materials, and building materials and perform various traditional functions. They also provide financial security for the farmers. At a National level, these breeds contribute 75% of the domestic milk supply and more than 95% of all the total beef production in the country (MAAIF, 2002).

Indigenous cattle breeds

There are 3 main indigenous cattle breed types in Uganda, namely;

1. The Longhorn Ankole cattle which is an intermediate *Bos indicus/ Bos Taurus* breed type with a small cervicothoracic hump. It has a relatively large body frame and characteristically long and large horns.
2. The East African Shorthorn Zebu which is a *Bos indicus* breed type with a small body frame, shorthorns and a large muscular thoracic hump.
3. The Nganda is an intermediate breed type of the above two breeds.

Introduced cattle breeds

A number of cattle breeds have been introduced in Uganda including the Friesian/Holstein, Jersey, Guernsey, Ayrshire for dairy production, and Hereford, Charolais for beef production and Brown Swiss for dual purpose. The Sahiwal and Boran breeds have also been introduced in big numbers.

Goats

Indigenous goat breed types

Over 99% of the population comprises the indigenous breeds. There are 3 main breed types namely; the small East African (SEA) goat comprise 53.2% of the total population; the Mubende goat breed type comprise 35.6%, while the Kigezi goat breed type comprise 11.2%. Other goat strains (of unknown percentages) include the Karamoja, Sebei, named according to the communities that keep them (MAAIF, 1999).

Introduced goat breeds

The introduced goat breeds and their crosses are estimated at not more than 5,000 in number in the country. They include the Toggenburg, Anglonubian, Saneen, Alpine and Boer breeds.

Sheep

The sheep population has undergone significant fluctuations characterized by declines and recoveries. Consequently, the population has remained fairly stable over the years, from 1.1 million in 1935 to 1.4 million in 1981 to the latest estimate of 1.1 million. Mutton and lamb are not as popular as goats' meat especially in western parts of the country. This may have contributed to the lack of significant increases in population due to neglect.

Indigenous sheep breeds

The national sheep flock is predominantly indigenous and comprises 3 main non-descript breed types namely; the Masai, the East African Black head, and the East African long tailed; their respective flock compositions are 22%, 50% and 27%. A full assessment for their impact as potential breed resources for meat production is needed and a full and detailed characterization of the 3 breed types is required for economic exploitation.

Introduced sheep breeds

In the past, exotic breeds of the corriadales, Roumney Marsh and Merino were introduced for the highland zones of Kabale, Mbale and Kapchorwa districts but this programme had no significant impact. The Merino and Doper sheep are now being reared on a few farms in the country.

Pigs

Indigenous pig types

Basically, there is only one non-descript indigenous pig, the Ugandan Black pig.

Introduced pig breeds

A number of pig breeds have been introduced into the country, notably the Landrace, the Large White, the Hampshire, the Duroc and more recently the British Hybrid P16.

Poultry

Indigenous poultry types

Uganda has a big resource of poultry, including chickens, turkeys, ducks and geese. Most of the chickens are called Nganda, Nsoga, Nkedi, Nyoro, Ntoro, etc, depending on the locality or region where the chickens happen to exist. Some phenotypic characterisation of indigenous chickens in Uganda has been done, reflecting a lot of diversity among the chickens. Genetic characterisation is on-going to elucidate more on their nature.

Introduced poultry breeds

A number of poultry breeds for both meat and egg production have been introduced in Uganda but have not been sustainable. Among the chicken breeds introduced were the Rhode Island Red, the Hubbard, the Arbor Acres, the Hybro, the Bovans Brown, the Bovans Goldline, the Australops, the Naira.

Strategies for Management

Management of the natural resource base

Prolonged heavy grazing contributes to the disappearance of palatable species and the subsequent dominance by other, less palatable, herbaceous plants or bushes. Overgrazing causes soil compaction and erosion, decreased soil fertility and water infiltration, and a loss in organic matter content and water storage capacity. The environmental challenges is thus to identify the policies, institutions and technologies which will enhance the positive and mitigate the negative effects of grazing.

With good management, livestock production can make a positive contribution to the natural resource base by enhancing soil quality, increasing plant and animal biodiversity and substituting for non-renewable energy resources. Evidence from recent studies shows that arid

Table 1. Estimated production (metric tons) in ASARECA member countries during 2002 and average growth rates for the period 1994-2002

Country	Dairy milk	Beef	Shoat meat	Poultry meat	Pig meat	Eggs
Burundi	19,000	9,000	4,000	5,000	5,000	3,000
Congo DR	5,000	13,000	21,000	18,000	40,000	7,000
Eritrea	52,000	17,000	12,000	2,000		2,000
Ethiopia	970,000	298,000	66,000	74,000	1,000	76,000
Kenya	1,800,000	290,000	53,000	54,000	12,000	61,000
Madagascar	535,000	148,000	10,000	62,000	63,000	19,000
Rwanda Sudan	85,000	19,000	3,000	1,000	300	2,000
Tanzania	3,072,000	367,000	262,000	30,000		46,000
Uganda	715,000	225,000	40,000	41,000	13,000	63,000
Total	511,000	97,000	31,000	41,000	78,000	20,000
% Growth 1994-2002	7,764,000 1.0	1,483,000 2.6	502,000 2.2	328,000 1.7	215,000 1.3	299,000 1.8

Source: FAO 2002.

regions contain dynamic and highly resilient ecosystems, with a strong capacity to regenerate rapidly when the rains return.

Additionally, traditional pastoral systems have conserved biodiversity because pastoralists have a direct interest in preserving a wide variety of plants for their gums and resins and medicinal value.

Loss of plant biodiversity for whatever reason ultimately leads to loss of animal biodiversity. Disaster and social insecurity can also negatively impact on animal genetic resource. For instance, drought, disease and political instability in the Greater Horn of Africa countries have contributed to reduction of cattle and small ruminant populations by as much as 60 to 70 percent. Such reductions can significantly contribute to reductions in genetic diversity (de Haan et al, 1997).

Establish inventories and characterize the AnGR

Documentation and characterisation of the AnGR help to make informed decisions and strategic improvement programmes.

Creation of awareness

Many Ugandans keep farm animals but very few are continuously managing them on a sustainable basis, particularly in view of conserving their unique attributes

National breeding programme

Figure 3 gives the major components of the envisaged breeding programme. If this is implemented, then Uganda would have given a good example to the other East African countries.

Institution of a strong herd recording system

Anything without record is likely to lose focus and credibility. There is no much debate on this.

Formation of farmer breeder associations

This ensures the following:

1. Ownership and sustainability.

2. *In-situ* conservation and sustainable utilisation of targeted breeds.

Research in livestock breeding

This is an area where we need to do a lot in terms of characterisation, development of sustainable breeding programmes, designing conservation programmes in partnership with farmer breeder associations, just to mention a few cases.

Strategic disease control

If diseases are not well tackled, then management of the AnGR may be futile.

Guidelines on import/ export and trade in animal genetic materials need to be strictly followed to prevent disease transmissions.

Networking

Networking among the various stakeholders is very crucial and fundamental. For example, networking between researchers and farmer breeder associations is essential for breed evaluations, breed releases and efficient utilization of AnGR.

Feasibility of Implementation

1. Institutional framework

A) Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

MAAIF has the mandate to support, promote and guide production of crops, livestock and fisheries so as to endure quantitative and supply of these products for domestic consumption, food security and export.

In conformity with the National Macro-economic policies (Privatisation, Liberalisation, Decentralisation and Democratisation), the role of MAAIF is to facilitate. It creates an enabling environment for other service providers in the agricultural sector, by performing the following functions.

- a) Formulating and/or reviewing policies, laws and regulations in the agricultural sector.
- b) Formulation National Plans and programs
- c) Setting standards of goods and services delivery
- d) Control of epidemic diseases and pests in crop, livestock and fisheries sub-sectors.
- e) Provides Technical back up, capacity building and support supervision of local governments and the private sectors.
- f) Monitoring and evaluating the performance of the agricultural sector.

B) MAAIF Agencies

- a) The National animal genetic resources centre and data bank (NAGRC &DB). The NAGRC & DB was established by act of Parliament, the Animal Breeding Act, 2001 2001, with a leading role in the production of quality livestock genetics for the Uganda farming communities. Additionally, the NAGRC & DB undertakes the training and sensitisation of extension staff and farmers on breeding techniques and proper management methods of livestock.
- b) The National Agricultural Research Organisation (NARO). NARO is linked to policy makers in MAAIF, to the Uganda National Council of Science and Technology and to farmers. It is also linked to Makerere University Faculties of Agricultural, Forestry and Veterinary Medicine through collaborative research.

C) The National Agricultural Advisory Services (NAADS). NAADS is a decentralized, demand driven and client program for delivery services. Public funds are provided by the government to farmer's group/through local governments, to enable them to contract private advisory services providers. It is based on the principles of farmer empowerment, deepening decentralization and promotion of private sector participation in the delivery of agricultural advisory services, including AnGR.

D) Dairy Development Authority (DDA). DDA's role is to carryout development and regulatory functions in the daily industry to ensure quantitative and qualitative production, processing and marketing of daily products. It collaborates with farmers, NAGRC&DB, NARO and the private sector in the utilization of AnGR.

2. The national animal breeding act (2001)

This is a basic and fundamental step in implementing the strategies.

3. National animal genetic improvement programme

This should have the following components:

- a) Livestock register
- b) Choice of breeds
- c) Breeding methods
- d) Zoning and stratification

These four are well catered for under the Act.

4. Strong and dynamic research system

The new agricultural policy sets pace for the above. The following areas have received priority attention already:

1. On- station and on-farm breed evaluation
2. Use of biotechnology in characterization and genome analyses
3. Population screening to identify elite animals.
4. On-station studies in heritability and repeatability estimates
5. Establishing the super-ovulatory responses among indigenous breeds
6. Establishing genetic makers associated with traits of economic importance

5. Formation of farmer breeders associations

A number of farmer breeders associations have been formed for cattle, goats, pigs and chickens. These are very pivotal in implementing the strategies.

Conclusions

There's therefore need to develop a coherent vision and mission for our animal genetic resources. There's also a need to articulate our national breeding programme vis-a-vis the existing national livestock breeding policy, to form breeders associations/ societies, carry out appropriate research in livestock and networking the researcher with the farmer breeder associations/ societies. Needless to mention, a productive herd is a healthy herd.

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