REPUBLIC OF KENYA

MINISTRY OF LIVESTOCK DEVELOPMENT

FINAL DRAFT
NATIONAL ANIMAL BREEDING POLICY

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Abbreviations and Acronyms

ADC	Agricultural Development Corporation
AnGR	Animal Genetic Resources
AI	Artificial Insemination
AIDS	Acquired Immune Deficiency Syndrome
ASAL	Arid and Semi Arid Lands
CAIS	Central Artificial Insemination Station
DGAK	Dairy Goats Association of Kenya
DNA	Deoxyribonucleic acid
DLP	Director of Livestock Production
EAC	East African Community
EASETA	East African Semen and Embryo Transfer Association
EMI	Embu Meru Isiolo
GDP	Gross Domestic Product
GPA	Global Plan of Action
GMO	Genetically Modified Organisms
HIV	Human Immune Virus
ICIPE	International Centre for Insect Physiology and Ecology
ILRI	International Livestock Research Institute
IPR	International Property Rights
KDB	Kenya Dairy Board
KLBO	Kenya Livestock Breeders Organisation
KNAIS	Kenya National Artificial Insemination Service
KSB	Kenya Stud Book
KVB	Kenya Veterinary Board
LRC	Livestock Recording Centre
MDG	Millennium Development Goals
MGBA	Meru Goat Breeders Association
MOET	Multiple Ovulation and Embryo Transfer
NDCBP	National Dairy Cattle Breeding Programme
NGO	Non Governmental Organizations
UNDP	United Nations Development Programme
OIE	International Organization on Epizootics
SPS	Sanitary and Phyto-sanitary Standards
SCNT	Somatic Cell Nuclear Transfer

CHAPTER ONE

1.0   INTRODUCTION AND BACKGROUND

1.1   Introduction

Livestock production in Kenya largely relies on the natural pasture, which is dependent on the country's soil and water resources. The sustainable use of these natural resources will largely determine the country's capacity for lasting food and nutritional security. An increasing human population, decreasing farm sizes and climatic changes are a threat to biodiversity in all agro-ecological zones and Animal Genetic Resources (AnGR). It is imperative that measures be taken to adopt sustainable use and management of AnGR. Animal genetic improvement involves a complex partnership involving different stakeholder, institutions, animal types and products. Through a combination of AnGR and physical factors, high and sustainable animal productivity can be achieved. An effective animal improvement system also requires a variety of information and its efficient utilization. Further, it is imperative to recognize that animal improvement is a rapidly changing industry with new technologies and improved production efficiency, even under conditions initially perceived as being unsuitable for any form of animal agriculture.

1.2   Policy Environment

Taking into account the importance of AnGR in sustainable development, this policy is formulated within the framework of the Global Plan of Action (GPA) on AnGR (2007). The GPA perspective, seeks to address policy challenges in AnGR through four pillars (Strategic Priorities for Action) at the regional and national levels: Characterization, Inventory, Monitoring of Trends and Associated Risks; Sustainable Use and Development; Conservation; and Policies, Institutions, and Capacity-building. In this regard the East Africa Community (EAC) is harmonising the national breeding policies of partner states.

Kenya is in the process of implementing its macroeconomic blue-print of Vision 2030. Within this vision, the livestock sector is identified as key towards the realisation of the economic pillar. The aspirations of the vision are also captured within the Sessional Paper No. 2 of 2008 of National Livestock Policy. Therefore, the National Animal Breeding Policy is critical in contributing to the achievement of both the Livestock and Millennium Development Goals (MDG) No. 1 and 7.

1.3   Animal Genetic Resources

The country is endowed with a large and diverse AnGR, which allows optimum exploitation of diversity in production environment. Currently the country uses mainly nine species of AnGR for food and agriculture: cattle, sheep, goats, camels, poultry, pigs, rabbits, horses and donkeys; each broadly classified as indigenous, exotic and crosses. The Indigenous AnGR are adapted to a variety of production environments and have multiple functions. On the other hand, the exotics have been developed for specialised functions under high input production systems. Considerable diversity also exists within species and breeds/types. Apart from pigs and rabbits, indigenous animals represent over 75% of the population of each species, but because of weak policy and less focused AnGR management strategies, breed replacement and uncontrolled crossbreeding pose a major threat to the indigenous AnGR. Other factors such as drought, insecurity and disease also threaten the indigenous AnGR.

1.3.1   Cattle

Currently the Short Horned Zebu represents the major genetic group of indigenous cattle in the country. The group is further divided into large and small types. The large type comprises of the Boran cluster (Orma Boran, Kenya Boran and Northern Frontier District Boran), Turkana and Karapokot, Kenya Sahiwal (exotic indicine). The small

type comprises of the small East African zebu, such as Nandi, Kavirondo and Kikuyu. The exotic group comprises the dairy types (Friesian, Holstein-Friesian, Guernsey, Jersey and Ayrshire); dual purpose types (Simmental, Red Polls, Brown Swiss); Beef types (Hereford, Santa Getrudis, Charolais, Galloway, Aberdeen Angus, Dexter), and a large genetic group of crosses.

1.3.2 Sheep

More than 90% of sheep in the country are indigenous types with distinct groups distributed in different ecological zones. The fat-rumped in the north, fat-tailed in the south (e.g. Red Maasai), and long tailed in Kuria and Migori districts. Exotic sheep comprise mainly the wool and meat sheep which include Romney Marsh, Corriedale, Hampshire and Merino. There are also crosses and synthetic breeds like the Dorper. Wool sheep are reared in the high and medium potential areas of the country under intensive and semi-intensive systems. Although there are indications for milk production potential in indigenous sheep, this potential has not been exploited.

1.3.3 Goats

Over 95 % of the goats in the country are indigenous, with a few exotic types and their crosses. The main genetic groups in the indigenous goats are the Galla found in the north, and the East African goat widely distributed in the south. The Galla has two recognised strains the long eared and short eared with dairy characteristics found in both. The exotic goats include the dairy types represented by Toggenburg, Sannen, Alpine, Oberhosli, meat types comprising Anglo-Nubian and the Boer; and the Angora for mohair. There is also a large genetic group comprising of crosses of the various breeds.

1.3.4   Camels

The Kenya camel is the *Camelus dromedarius* which is the single humped camel. There are three main genetic groups: indigenous represented by Somali, Rendille/Gabra and Turkana types; exotic types imported from Pakistan and their crosses. The camel is traditionally used in the northern dry areas and their population is estimated at one million. Partly due to changing climatic patterns, the camel is being introduced into the southern rangelands. The camel is more reliable as a milk producer than other species of livestock under arid conditions, with an average camel dam producing 4.5 kg of milk per day within 11 to 16 months lactation.

1.3.5   Poultry

Poultry genetic resources comprises of chicken, turkeys, geese and ducks. The chickens comprise of indigenous types which are the majority and are reared for both meat and eggs. While the exotic types are reared for commercial production of eggs and meat mainly under intensive systems of production. A few turkeys, ducks and geese are kept and account for about 2% of the poultry species. There are three major poultry production systems which include extensive, semi intensive for indigenous poultry and intensive for exotic poultry.

1.3.6   Pigs

Pig genetic groups found in Kenya include Large White, Landrace, Duroc, Hampshire, Saddleback and crosses. All pigs in Kenya are exotic, imported from Europe and Asia. Currently most of the pig production is carried out by small scale farmers with less than twenty sows. They are managed under two systems, intensive for commercial production and extensive for subsistence purposes.

1.3.7   Horses

The population of horses in Kenya is small, totalling about 900 of which 800 are registered with the Jockey Club of Kenya. There are no indigenous horses in the country. Most of the horses were imported from Europe, U.S.A., South Africa and Zimbabwe. While the rest were imported from Ethiopia, Saudi Arabia and Somali, most of the horses in the country are used for sports, and security.

1.3.8 Donkeys

There are two types of donkeys in Kenya, all indigenous, the Grey Somali donkey which is common in the northern districts of Kenya and the Maasai donkey, which is generally brown and is commonly found in many parts of southern Kenya. The donkey population and their trends in the country are not well documented but the population is estimated at 613,000. They are basically kept as draught and pack animals and some communities use them for food.

1.3.9 Rabbits

The population of rabbits has been increasing steadily in high and medium potential areas due to establishment of rabbit multiplication centres in several Districts. The main genetic groups are Kenya White, New Zealand white, Californian White, French Earlope, Chinchilla, Flemish Giant and their crosses. There is no documentation on the existence of indigenous rabbit genetic resources in Kenya. Rearing of rabbits is a low capital investment, which has contributed to its popularity among small scale farmers.

1.3.10 Bees

There are two main bees' genetic groups in the country: *Apis mellifera adansoni, and Apis mellifera.* But various strains of bees exist in the country of which the stinging and stingless types exist. Bees are mainly kept for honey, beeswax, propolis, royal jelly, brood, bee venom, and for crop pollination.

1.3.11 Emerging livestock

The emerging livestock includes; ostrich, crocodiles, quails, guinea fowls, guinea pigs, snakes, frogs and pigeons. These are animals that over many years were regarded as wild, and are now being reared for food, skins and feathers. In the country, they are under the protection and regulation of the Wildlife Act, which limits their utilization.

1.4   Production systems

In Kenya production systems range from large-scale extensive beef, lamb, wool, mutton and mohair production, to intensive dairy, pig and poultry systems, an increasing number of game ranches as well as the small farm animals. Indeed small scale intensive farming has become a major contributor to the national and household food security as well as sustainable farming systems in the country. The production systems exist within highly variable agro-climatic conditions (soil type, altitude and rainfall), ranging from very arid to afro-alpine mountain zones. Livestock production and husbandry objectives are equally diverse within these environments. Animal husbandry objectives range from extensive pastoral subsistence with a more traditional emphasis on numbers rather than productivity and profit, to highly developed intensive systems with an emphasis productivity and profitability per animal and per unit of input. The former husbandry system is found in the arid and semi-arid lands (ASALs), while the latter is mainly found in the high and medium potential zones. Cattle are the most important in terms of biomass (73%) followed by sheep and goats (19%) and camels (6%). Indigenous livestock are the majority in all species, except for the pigs. Over 60% of the livestock population of each species are in the ASAL areas while the rest are in the medium and high potential areas. The only exceptions are the pigs, poultry, rabbits and horses, which are predominantly found in medium and high potential areas.

1.5   Role of livestock

Livestock sector, accounts for about 10% of the country's GDP and about 42% of the agricultural GDP. It also supplies the domestic requirements of meat, milk and other

livestock products while accounting for 30% of the total marketed agricultural products. The sector earns the country substantial foreign exchange through export of live animals, hides and skins, dairy products, and some processed pork products and employs about 50 percent of the agricultural labour-force and contributes substantial earnings to household through sale of livestock and livestock products; and provides raw material for agro-industries. In addition livestock contributes manure, draught power and fuel; other uses are socio-cultural, recreation and sports

1.6   Stakeholders in the livestock sector

The main stakeholders in the livestock sub sector are the farmers who own AnGR. Another major stakeholder is the Ministry responsible for livestock development, research institutions, academic institutions, farmer organizations, service providers, Non-Governmental Organization (NGOs), state corporations, international organizations and financial Institutions.

Collaboration between institutions on issues related to AnGR, and the co-ordination of key activities that would impact AnGR within the country have been weak. To enable development and improvement of AnGR in a sustainable manner, appropriate policy and legal frameworks are required.

1.7 Improvement Strategies for Animal Genetic Resources

The government and other stakeholders have implemented several livestock improvement programmes targeting different species. These programmes however tended to be short term and targeted few numbers due to budget restrictions. Their sustainability was thus not guaranteed, occasioning the collapse of some of them. Animal improvement programmes require coordinated, focussed and long term initiatives in order to achieve the desired goals.

The following are some of the breeding programmes that have been implemented.

1.7.1 National Dairy Cattle Breeding Programme

This was the first major livestock improvement programme that was meant to improve the dairy sub-sector. It involved the progeny testing programmes, the contract mating scheme (bull-dam recruitment schemes), the recording services for milk and the Artificial Insemination (AI) delivery services that together were used to improve the dairy herd in Kenya. The key institutions that were involved in this system included the KMR and KSB (which later became the KLBO) LRC, CAIS and KNAIS.

1.7.2. Kenya Beef Recording Scheme

The beef recording scheme was designed to register animals and capture data on the beef herd performance in order to inform beef improvement activities in the country. However, beef recording has declined over the years as ranchers do not see the immediate tangible benefits of recording. But with the increasing importance and price premiums attached to registered animals in the external markets, recording and registration is being taken up by some ranchers. Further, pastoralists and other keepers of indigenous breeds should be involved in recording and improvement activities. Ideally, this process should be started by the exhaustive characterisation and development of breed standards for all the breeds. The LRC and Ranches are the key institutions involved in beef recording.

1.7.3 Sheep and Goat Development programme

There was a Government and United Nations Development Programme (UNDP) initiative that was designed to achieve the following broad objectives; Raise the productivity of sheep and goats in the country; increase meat output from small ruminants so as to alleviate the pressure exerted on beef; build institutional capacity; Build the breeding flock in order to boost the national small ruminant gene pool; Provide extension services to farmers to increase their small ruminants' productivity; Multiply selected and improved small ruminants and distribute them to farmers to

improve their stocks. This resulted in the establishment of the following breeding stations for small ruminants; Naivasha, Marindas, Matuga, Buchuma, Witu, Kitengela, Kiboko Kimose and Macalder. Since the establishment of the programme in 1972, there have been modest successes in some of the objectives. However, the stations have been unable to meet the demand for breeding stock and are currently constrained by; inadequate management of the programme, lack of private sector participation ,poor infrastructure, insufficient funding and undefined land ownership of the stations.

1.7.4 National Poultry Development programme

Poultry have a significant role in poverty alleviation as they are easy to acquire and rear. The poultry programme, which came to an end in mid 90s, was aimed at improving indigenous birds. Currently there is no national poultry improvement programme and there is need to develop one for indigenous flock. Earlier attempts to improve indigenous poultry have generated useful lessons that can be internalised in the development of new programme, these lessons would include; expanding the programme to focus on other emerging species such as ducks, ostriches, and turkey. There is therefore need to develop individual species improvement programmes.

1.7.5 Community based breeding schemes Experiences from NGO supported initiatives have indicated that there is great potential in community based breeding schemes as an alternative option for the development and promotion of small ruminants especially under smallholder production systems. The approaches such as those used by the Meru Goat Breeders Association (MGBA) and the Dairy Goat Association of Kenya (DGAK) should be encouraged and supported to levels of self sustainability. However, community organizations are faced with various challenges such as lack of adequate capacity to run a breeding programme.. Community associations should be empowered to oversee the registration of their animals and self regulation of improvement activities. To allow and promote animal registration by

community groups, services such as animal recording and registration should be made more accessible to farmers in remote locations. In addition the livestock industry needs to take initiatives to provide incentives that encourage farmers to register their livestock.

1.7.6 Livestock Improvement and Multiplication Centres

Currently the supply of breeding stock has not grown sufficiently to meet the growing regional demand. There is need to strengthen and improve the existing livestock multiplication farms for emerging livestock in collaboration with the private sector to ensure a reliable supply of breeding animals for the country. Whereas these farms still serve as useful conservation and multiplication centres, the development of modern reproduction technologies such as MOET have increased the opportunities for rapid expansion of flock and herd sizes. Therefore it would be desirable to incorporate some of these modern reproduction technologies in these farms. In this regard the proposal for government and private sector collaboration in the development of breeding stock need to be considered. Further, the government needs to monitor major identifiable herds in the country with a view to protecting and conserving established breeding stock.

CHAPTER TWO

2.0 POLICY RATIONALE AND OBJECTIVES

2.1 Policy Rationale

Kenya has no documented animal breeding policy to promote sustainable use, development and conservation of its domestic and emerging animal genetic resources. Despite this limitation, the basic institutional framework has been developed over the years through government and livestock producers' initiatives. However, these initiatives currently operate independently with little or no cooperation between them, sometimes with overlapping objectives, hence are unable to achieve any level of efficiency or improved productivity within the industry. Internationally, rapid economic and technological changes are taking place in the livestock sector that call for a need for all countries to adapt to the changing demands from the industry.

The gap created by the absence of a comprehensive animal breeding policy has resulted in ad hoc, uncoordinated and unsustainable implementation of breeding programmes mainly with external support. Such programmes include the National Dairy Cattle Breeding Programme (NDCBP) for AI Bulls, the Dual Purpose Goat Development Project the Cattle Crossbreeding Schemes at Mariakani and the Embu-Meru-Isiolo (EMI) Goat Improvement Project. However, these programs tend to have weak implementation frameworks and inadequate local ownership by farmers and key stakeholders.

Some positive achievements have been realized in the livestock sub-sector, particularly the utilization of exotic breeds for dairy production. However, the lack of a breeding policy has retarded the development of livestock resources and at times facilitated the loss or erosion of some indigenous breeds. There is also need to strengthen technology development, transfer and information systems to address the limited linkage in terms of research and development.

In many areas of AnGR the policy and legislative framework in the country do not

effectively address the challenges and emerging issues in the management and development of AnGR. This therefore calls for a more encompassing policy and legal framework on AnGR with clear and focused objectives. The policy is formulated within the broad framework of the National Livestock Policy and the Global Plan of Action for AnGR.

2.2   Policy Objectives

The broad objective of the policy is to ensure national food and nutritional security, improve AnGR productivity to enhance socio-economic development and address emerging challenges in livestock breeding.

2.2.1   Specific Objectives

In order to realize the broad objectives, the following specific objectives will be pursued:

1.   Promote inventory, characterization and monitoring of the trends and associated risks in AnGR.

2.   Promote the sustainable use and development of Animal AnGR

3.   Enhance the conservation of animal genetic resources

4.   To promote research and development in AnGR

5.   To develop appropriate institutions, legal framework and enhance resource capacity in AnGR.

The main instruments to operationalize the National Animal Breeding Policy will be the enactment of an Animal Breeding Act and the institutional framework.

3.0   CHALLENGES AND POLICIES

3.1   INTRODUCTION

Animal Genetic Resources for food and agriculture are an essential part of the biological basis for the national food security and contribute to the livelihoods of the national population. A diverse resource base is critical in the exploitation of the different production environment prevailing in the country for human survival, well being and eradication of hunger. It is for this reason that a global plan of action on AnGR has been adopted. In this regard, four major pillars have been identified: 1. Characterisation, Inventory and monitoring of trends and associated risks. 2. Sustainable use and Development, 3. Conservation and 4. Policies, Institutions and capacity building. These pillars inform the national policy challenges and interventions on AnGR.

3.2. Inventory, Characterization, and Monitoring.

Animal inventory involves identification and documentation of the country's AnGR, their distribution and production systems. Information from inventories and monitoring of trends and associated risks is necessary to determine conservation strategies. A comprehensive inventory of AnGR currently in the country has not been established, hence limits the country's ability to characterise its livestock population. Characterization involves classification and assessment of productivity and other attributes such as disease resistance. Since the early 1990's a number of breed characterisation activities have been undertaken to provide information on phenotypic characteristics and genetic diversity in indigenous livestock, particularly cattle, sheep, goats and poultry. These initiatives for phenotypic characterisation of indigenous AnGR have been ad hoc, independent and largely uncoordinated. A good understanding of breed characteristics is necessary to guide decision making in livestock development

and breeding programmes. The results from characterization enable farmers to determine which breed to use under prevailing production conditions. Therefore, there is a need for accurate statistics and information on breeds, numbers, locality, production systems and the management skills of livestock keepers, breeders and producers. Reliable statistics and information are needed to assess the current status of AnGR in the country and to facilitate strategic planning and management at all levels. The data generated should be stored in a National databank as part of a National Animal Recording Scheme.

There are no formal mechanisms to conserve the genetic resources which may otherwise be lost. Urgent action is required to prevent possible extinction of some indigenous populations, particularly in the medium and high potential zones of the country where exotic breeds with high production potential from temperate environments are rapidly replacing indigenous types. Some breeds which may have been lost include the Nandi and Jiddu cattle.

In this regard the government in collaboration with key stakeholders will initiate mechanisms to carryout a comprehensive inventory and characterisation of the AnGR, conduct regular census, define which genotype fits in which ecological zone and promote recording and registration of breeding animals. Further, in collaboration with other institutions the Ministry in–charge of AnGR will strengthen the institutions charged with management of animal genetic resources.

3.3. Sustainable use and Conservation of Animal Genetic Resources

Sustainable use involves efficient utilization of available resources, along with associated appropriate technologies hence improving producers' income, while avoiding the depletion of natural resources. Currently, the challenges in sustainable use include environmental degradation and pollution, lack of adequate skills and technology, changes in commercial preferences and consumer demands.

AnGR may be conserved *in-situ*, that is, conservation of live animals in their natural environment, forestalling inbreeding or interbreeding with other populations. *Ex-situ* conservation involves conserving genetic material outside its natural environment either live or through cryopreservation in form of frozen tissues, ova, embryos, semen or even actual genes in gene banks. Over the years, farmers have undertaken *in-situ* conservation through regular use of AnGR for food and agriculture. Complementary in-situ conservation is being carried out by institutional farms such as research stations, state farms and universities. Because of lack of arrangements for regular population monitoring, there are no planned ex-*situ (in-vivo/in –vitro)* conservation programmes. However, there are facilities, though inadequate, for cryopreservation in the country. Presently, the CAIS handles only frozen bull semen, but has the capacity to handle other animal genetic material. There is need for specialized capacity building and equipment to facilitate handling of other animal genetic material.

Current global concerns on the loss of diversity of AnGR require that every country takes initiatives to take inventory, characterize and conserve the indigenous AnGR.

The conservation challenges identified are indiscriminate crossbreeding, use of a few commercial breeds reducing diversity, natural disasters such as disease epidemics, drought, wars and rustling, breed replacement and neglect of traditional production systems. As a part of the Global Plan of Action the country should actively participate in the global and regional initiatives for the management of AnGR. Conservation through sustainable use is a major component of these initiatives.

In-line with the National Livestock Policy and Global Plan of Action for AnGR, in collaboration with other institutions and stakeholders, the government will facilitate sustainable use and conservation both in-situ and ex-situ of the Animal genetic resource in the country, while maintaining the strategic AnGR reserve in public farms.

3.3.1 Pastoralism

Pastoral production systems are defined as those in which at least 50% of the household gross revenue comes from livestock or livestock related activities. There are two major categories of pastoralism, mobile systems, including transhumance and normadism in the ASAL, and the sedentary systems. It must be noted that close to 70 percent of domestic AnGR are found in the ASAL areas of the country. Given the fragile nature of these eco systems, pastoral production systems require special attention. Pastoralists and indigenous communities play an important role in *in-situ* conservation and development of AnGR, because they keep animal genetic resources that are adapted to ASAL environments. It is therefore important to understand and support their roles in management of the resources. However, the current climatic inversions have impacted negatively on sustainable use and conservation of AnGR in these areas.

The Government, in partnership with other stakeholders, will continue to support environmentally sustainable pastoral production systems, including appropriate animal breeding strategies and husbandry practices, while recognizing traditional knowledge as the basis of these initiatives'. In addition conservation of breeds well adapted to pastoral production system will be promoted and undertaken.

3.4 Animal breeding research, development and technology transfer

An effective animal breeding research system is essential for developing appropriate technologies for sustainable use, including conservation of AnGR. Currently, the Government, in partnership with various development partners funds most of the animal breeding research and technological development in the country. Institutions mandated to conduct animal breeding research include both National Agricultural Research Systems and international organizations such as the International Livestock

Research Institute (ILRI), and the International Centre for Insect Physiology and Ecology (ICIPE).

However, animal breeding research is faced with several and diverse challenges. These include: low investment in animal breeding research, inadequate attention to post-production research, inadequate dissemination of the research findings and limited networking and collaboration between key stakeholders.

In collaboration with other stakeholders, the government will seek ways and means to diversify the funding base and enhance financial sustainability of animal breeding research capacity. Budgetary support for research will also be enhanced in accordance to the contribution of the livestock sub-sector to the overall agricultural sector and the national economy. Further, public research institutions will be encouraged to commercialize the technologies that they develop. In line with the national livestock policy, a fund for strategic research and commercialization of appropriate technologies encompassing all the livestock species will be set up through a private/public partnership initiative.

3.5   Breeding methods and related technologies

There are a number of breeding methods that are available for use in animal genetic improvement. Some of these methods include pure breeding, line breeding and line crossing, Crossbreeding and formation of synthetic breeds. In addition, there are a number of reproduction based biotechnologies that have been developed over the years for use in the animal industry. Although, these breeding methods are available in the country, their utilization has been constrained by small population sizes, single sire flocks/herds, ineffective institutionalised animal identification, recording, pedigree registration and inadequate capacity.

In this regard, the government in collaboration with stakeholders will promote the establishment of sustainable livestock improvement schemes and programmes to strengthen national recording systems and breed societies. In addition, to ensure sustainability of AnGR, guidelines will be

developed to promote appropriate matching of breeds to production environment in partnership with relevant stakeholders. In partnership with the livestock keepers and other key stakeholders, the government will promote planned crossbreeding; and to ensure sustainability of breeding programmes, avail necessary financial resources for identified programmes to expand their operations.

3.5.1 Cryopreservation

Cryopreservation is an important complimentary tool for in-situ conservation. It is the strategy of choice to rescue a breed at risk (less than 1000 breeding females and less than 100 breeding males) or threatened (less than 100 breeding females and less than 5 breeding males) and as backup for loss of genetic variation. Where breeds are at risk or threatened, *in-situ* strategies are ineffective in reducing loss of genetic resources. Semen, embryos, oocytes and stem cells are traditionally targeted as genetic material for cryopreservation of farm animal genetic resources. Currently, the requisite infrastructure and human resources for cryopreservation are inadequate in the country. Furthermore, a major drawback to preservation is lack of an inventory.

The government in collaboration with the stakeholders will strengthen the existing institution, establish an operational gene bank for AnGR and build the requisite capacity. The government will encourage the setting up of other animal breeding facilities.

3.5.2 Artificial Insemination

Since AI was introduced in the country in the 1930s, its adoption grew to a peak of 549,000 inseminations per year (30%), covering mostly the national dairy herd and an insignificant portion of the beef herd. Initially it was a government supported initiative and service with little participation from beneficiaries. Due to poor performance of the economy and the dairy sector reforms of the 1980s, the government, partially withdrew its support to delivery of AI services, leading to a relapse in the use of unscreened bulls

of unknown genetic merit. The use of unscreened bulls has caused a resurgence of breeding diseases and other associated disorders in cattle. This, coupled with ineffective recording, has led to a high degree of inbreeding within the cattle population.

In view of the high demand for heifers, some farmers currently prefer to use sexed semen with a high chance of producing female offspring. Consequently, the demand for imported sexed semen is increasing. However, this semen has been noted to have lower conception rates relative to those obtained through natural service and AI. This problem is currently being addressed by on going research at the global level.

In collaboration with other stakeholders, the government will promote and strengthen farmer groups, co-operatives and other community-based organizations to undertake A.I services in areas where privatization has taken root. In other areas where we have potential to exploit AI, the government, will promote formation of farmer groups, cooperatives and other community based organisations to undertake AI services. In pastoral areas, the government will lay more emphasis in promoting use of good quality indigenous breeds for natural service through formation of breeding groups.

3.5.3   Multiple Ovulation and Embryo Transfer

Multiple ovulation and embryo transfer refers to a technology in which a superior female is super-ovulated to release many ova which on fertilisation are harvested and transplanted in recipient (surrogate) females. This technology can be used to rapidly multiply genetically superior animals and for safe cross border exchange of genetic material.

Multiple Ovulation and Embryo Transfer was initially introduced in late 70's in dairy cattle and was later expanded to beef animals. Subsequent application of the technology has involved importation of embryos for production of genetically superior animals and research in disease resistance (trypano-tolerant Ndama cattle). Pursuant to this initiative stakeholders in the country have formed an organisation, East Africa semen and embryo transfer association (EASETA) to develop, promote and give technical guidance

on AI and MOET in the country. The main challenges include integration of the technology in the breeding programmes and lack of awareness among the potential users of the technology.

3.5.4 Ovum pickup, in-vitro fertilization and embryo transplantation

In addition to MOET, ovum pickup, in-vitro fertilization and embryo transplantation is also being utilised on a limited scale to obtain cheap embryos from slaughter house material and live females. The technology involves recovery of embryos, incubating them to maturity in special biological media, before fertilization in test tubes using pre-collected and processed semen. The embryos are allowed to grow in the media for seven days after which they are transplanted to prepared recipient cows which carry the pregnancy to term. This technique has the potential for production of cheap FI crosses between dairy bulls and indigenous breeds.

3.5.5 Cloning

In commercial livestock cloning entails a form of nuclear transplantation to produce copies of desired or outstanding individual animals. In combination with embryo transfer technology, cloning can be used to rapidly improve livestock productivity by producing many progenies of high genetic merit. This technology has the potential to contribute to food security and nutrition as far as animal based protein is concerned. However, a major challenge is the possible production of genetic defect and physical malformation. Research is ongoing to produce stable clones.

3.5.6 Transgenic animals

Transgenic animals are produced by introducing certain genes into the oocyte of an animal. These genes are then incorporated into the DNA of these oocytes. Genes for specific traits that can be identified – and even genes for a specific trait from another

species can be introduced in this way. Human milk proteins, for example, can be produced in cow's milk in this way. As this involves the modification of the genetic structure of the animal, the relevant provisions of the Biosafety Act, 2009 should be applied in such cases. Where Somatic Cell Nuclear Transfer (SCNT) or cloning, is therefore used to duplicate a transgenic animal, care will have to be taken to ensure that the provisions related to the transgenic process have been complied with as well

In this regard, taking into account other policies and regulations, the Government in collaboration with relevant stakeholders will invest in equipment, institutional and human capacity to enhance the utilization of contemporary and emerging breeding technologies. The government will facilitate the integration and application of the technology in the breeding programmes and capacity building. Further, where natural service is used, the bulls will be evaluated and put under breeding disease surveillance.

3.6   Trade and sharing in animals and animal genetic materials

The country has the potential to benefit greatly from sharing of animal genetic resources and their products. There has been formal and informal internal and cross border exchange and trade on genetic material. The benefits accruing from this exchange can spur the growth of the livestock industry in this country. The major challenges in sharing animal genetic material include porous borders, inadequate legal instruments, lack of certification arrangement (including quarantine, breed evaluation and standards), weak linkage between regulatory institution and other stakeholders.
Equity in the sharing of the benefits arising from AnGR is critical in the promotion of their sustainable use and development. Despite its important role, equity in the sharing in the benefits in AnGR is generally lacking.

In order to address these challenges, the government, with relevant stakeholders will ensure that trade and exchange of animal genetic materials is sufficiently monitored, certified and regulated.

Where necessary, the government will establish appropriate institutions on trade and exchange of animal genetic material. The government will promote a fair and equitable sharing of the benefits arising from the use of AnGR, while recognising the role of traditional knowledge, innovations and practices relevant to the conservation of animal genetic resources and their sustainable use.

CHAPTER FOUR

4.0   LEGAL AND INSTITUTIONAL FRAMEWORK

4.1   Legal Framework

The current weaknesses in the legal and institutional framework have been noted as one of the main contributors to the limitations in the performance of the breeding industry**.** The key legal weaknesses that have been observed include the regulation and facilitation of animal breeding services, trade and certification, quality assurance of breed inputs and products, coordination of research and extension.

In order to address some of these challenges, a review of the current legislation and institutional framework will be undertaken with a view to streamlining their operations and coordination.

4.2   Regulation of sourcing, exchange and benefit sharing

Currently there is no clear direction of sourcing AnGR; this may have created a gap where any person can source genetic material without clear reference to relevant regulatory authorities. Some farmers have allowed private sourcing of genetic material from their herds for export, while withholding vital information on the exchange. This may occasion loss of vital material from the country. In addition, it may result into lack of adequate compensation and benefit sharing to farmers who own these animals.

4.2.1 Collection and movement of animal genetic materials

The country is regarded as an important source of livestock genetic material. The rich diversity in AnGR which has been developed over a long period, have become adoptive to local climatic conditions. Currently, the ADC and private large scale farms are the custodian of stud herds/flocks and the main source of breeding stock for the local and export markets. There is need to encourage other stakeholders in the livestock sector to establish stud herds for production and distribution of good quality genetic material. This will increase diversity and improve productivity of the national herd/flock. The Director of Veterinary Services is the one currently charged with regulating the collection and trade in animal genetic materials.

4.2.2 Certification of collection centres' and collections.

For purpose of disease control, quality control and breeding for optimum performance and productivity it is necessary that collection centres meet OIE standards and be certified by the relevant government office. Equally the staff in collection centres should be qualified and certified by the appropriate professional body. Similarly the material and equipments used must meet the set standards. In response and in view of rapid growth in provision of breeding services by the private sector, the government will encourage setting up of private collection centres' in order to meet the increasing demand for breeding services provided the centres meet the set standards.

In this regard the government will put in mechanisms to promote the establishment of certified collection centres for genetic materials. To prevent misuse of the Genetic material, the ministry in-charge of livestock affairs will improve the capacity and empower the relevant government agencies in discharging this mandate.

4.2.3 Registration and certification of donor animals.

The Breed Societies have been promoting various breeds through setting of breed standards and inspections for purpose of registration. The KLBO (Kenya Livestock

Breeders Organization) has been promoting the grading-up scheme and the pedigree registration of various breeds for breed improvement. The organization is constrained by inadequate manpower and financial resources. In the country most livestock herds are not registered and animal recording service is inadequate or non existent in most farming enterprises, especially the small holder farms. Furthermore, animal registration and recording are not operated as an integrated system, for efficient database management and utilization.

The inadequate coordination and harmonization of activities carried out by various breeding organization has adversely affected the implementation of national breeding programmes. Further, lack of guidelines, expertise and planned recruitment of breeding stock for the local and export market has led to export of non registered animals as well as depletion of the national genetic resource.

To address this challenge KLBO and the breed societies and other organisations performing similar functions will be strengthened to play their role in promotion of breeding and trading in animal genetics. Adequate resources will be availed towards this endeavour and strong partnership established between these stakeholders. The government will also legally empower relevant breed societies and specifically define their roles in terms of certification of donor animals and inspection.

4.2.4 Intellectual Property Rights.

Intellectual Property Rights (IPR) refers to intangible property resulting from human ingenuity. It describes a wide variety of property including inventions, literacy and artistic works, and symbols, names, images and designs used in production and commerce. IPR introduces the concept of legal ownership of intellectual property. The rationale for protection of IP is that it fosters innovativeness by encouraging authors and inventors to disclose their works in the public domain in exchange for exclusive rights. Patents represent the largest form of intellectual property and their development is regulated by the law. It is clear that the issue of patentability of an animal genetic

material is becoming a real concern and challenge in safeguarding owners of animal genetic material who may be exploited by lack adequate protection.

In this regard, the country will safeguard against bio piracy of animal genetic material to avoid loosing their intellectual property rights. In an attempt to address the aspects of IPR the policy will ensure an inclusive approach to all relevant aspects of IPR. This will recognize that livestock keepers are the custodians and breeders of the diverse genetic pool in the country. It is necessary that benefits accruing from genetic resources be shared equitably. To address matters relating to patenting in line with the existing laws and regulations, the government will develop mechanisms to protect genetic material from being relocated and distributed from Kenya to other countries for re-export without reference to the livestock keepers in the country as the original owners of the genetic materials.

4.2.5 Bio safety and Bio ethics:

Recent developments in animal breeding technology have occasioned issues dealing with bio safety and bio ethics in animal genetics. In some areas the ethicacy of these modern technologies such as genetically modified organisms (GMOs) have remained contentious and their true impact not well understood. In the country, there is no comprehensive legal framework to fully address the challenges posed by the new technologies. However, much of the current legislation and institutional framework puts emphasis on issues such as Sanitary and Phytosanitary Standards (SPS) at the expense of emerging technological challenges.

In this regard the government will develop appropriate institutional and legal framework to ensure adequate regulation in the utilization of modern technologies and emerging issues (bio piracy).

4.3 Institutional framework

4.3.1 The Ministry and the custodian of the policy

The ministry in charge of livestock affairs has the major responsibility of creating and facilitating a conducive environment for players in the breeding industry, through the development of an effective policy. This is achieved through, the technical Departments of Livestock Production and Veterinary Services, and two regulatory boards, i.e. Kenya Dairy Board (KDB) and Kenya Veterinary Board (KVB). Livestock breeding services in the country are currently fragmented, and weakly coordinated.

In this regard, An Animal Genetic Resources Board will be established to co-ordinate and regulate all breeding activities and to give direction on breeding strategies. This board will over see the functions of all institutions involved in animal breeding in the country.

4.3.2 The Technical Departments

The Department of Livestock Production has the mandate to create the necessary environment for improved production of livestock and livestock products on a sustainable basis. The department focuses mainly on animal nutrition, animal breeding, animal husbandry, range development and livestock marketing. In addition to these the Department has various livestock multiplication farms. These farms face various challenges such as lack of infrastructure, manpower and finance. Subsequently they are underutilized and do not improve breeding services in the country. The DLP also lacks necessary legislative mandate to effectively carry out its core functions.

The Department Veterinary Services is mandated to conduct surveillance and monitor disease outbreaks and the control and eradication of livestock diseases. It also inspects and certifies animal and animal products for purposes of public health and trade by ensuring SPS regulations and international animal and animal products standards. In

addition, it regulates and supervises AI service providers and manages the Central Artificial Insemination Station (CAIS). This institutional arrangement has contributed to weaknesses in service delivery by station. The institutional framework in the breeding industry requires a dynamic approach, to keep pace with current developments.

In this regard   the government will restructure the livestock multiplication farms. This process will encompass closer collaboration with other public institutions involved in breeding activities and relevant stakeholders. To streamline their functions the government will improve on their technical and management capacity and designate some of them to be breed specific, the farms will also be transformed to act as the country's strategic breed reserves.

4.3.3   Central Artificial Insemination Station

The Central A.I Station (C.A.I.S) was established as a semen production and distribution station by Kenya Gazette notice number 557 of 19th June, 1946. To achieve its objectives, the Station collaborates with other breeding organizations such as the Kenya Stud Book, Dairy Recording Services of Kenya and Livestock Recording Centre in implementation of Contract Mating and Progeny Testing Programmes. The Station has linkages with Breed Societies, individuals and institutional farms which provide the herds for its Breeding Programmes. The Station is currently limited in terms of technology, resources and lacks autonomy for efficient operations.

To fully realize its objectives, expand and modernise its operations, the Station will be largely autonomous and commercialize some of its activities. In addition, the station will serve as a national gene bank for all livestock species and operate under the guidance of the Animal Genetic Resource Board as provided for in the National Livestock Policy.

4.3.4   Research organisations

A number of National Agricultural Research and Development systems are currently undertaking livestock breeding research in collaboration with regional and international research institutions. However, the collaboration among these institutions is weak and needs to be strengthened.

The ministry in charge of livestock will institute the necessary measures to ensure strong collaboration, not only among the institutions, but also with the livestock producers.

4.4   Financing Breeding Programmes

Due to its vital nature, the breeding industry is key to achieving sustainable increases in animal production and enhancement of farmers' livelihoods. Increased funding to the breeding industry will, therefore, contribute significantly to the realization of the national developmental goals.

Towards this end, the government and in collaboration with relevant stakeholders will mobilize resources for initiatives in AnGR.

CHAPTER FIVE

5.0   CROSS-CUTTING ISSUES

5.1   Land, Water and Environment

Land and water are basic resources for animal breeding and production. A holistic environment is required for sustainable animal production and food security. But increasing human population and its attendant activities have resulted in the environmental destruction, land degradation and poor water quality and quantity. Equally, the resulting small land sizes have presented new challenges to animal breeding and production.

In addressing these problems, the government in collaboration with relevant stakeholders will set clear guidelines on land and water usage to minimize distraction to animal breeding activities. But where these adversely affect animal genetic resources, mechanisms to mitigate possible losses will be instituted. The ministry in charge of livestock affairs will liaise with relevant authorities to promote and enforce adherence to the sustainable environmental management practices and guidelines.

5.2   HIV/AIDS and other diseases

The prevailing HIV/AIDS pandemic has resulted in the erosion of the human resource and finances required for animal breeding and production and to care for the sick and the orphaned. In addition, there is erosion of animal genetic resources through sales or slaughter to care for the sick and the orphaned. Zoonotic diseases can disrupt breeding and other farming activities.

In cognizance of the fact that human health is vital for increasing animal production   the Ministry in charge of livestock affairs, in collaboration with other stakeholders, will develop measures aimed at controlling HIV/AIDS, Zoonotic diseases and their socio-economic impact.

5.3   Gender and Youth

Women and youth have an important role in animal breeding, especially at the farm level. For instance, women contribute between 60-80% of the labour-force, especially in ASAL areas and work longer hours than men, but have limited access to resources such as land, credit facilities and information. Furthermore equity in sharing the benefits from AnGR is lacking.

In this regard the Ministry in charge of livestock affairs, in collaboration with stakeholders, will incorporate gender sensitive programmes for women and youth empowerment in breeding activities.

5.4   Monitoring and Evaluation

Efficient monitoring and evaluation is key in determining the policy outcomes over time. It is also critical in the sustainable management of animal genetic resource, including population trends, risk levels and genetic progress from breeding programmes. It will also inform the necessary adjustment to the breeding programmes.