Draft Country Report

Namibia

State of Farm Animal Genetic Resources

Compiled by:

J.F. Els

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PART I.

The State of Agricultural Biodiversity in the Farm Animal Genetic Resources Sector of Namibia

1.1 Overview of Namibia's animal production systems and related biological diversity

1.1.1 General Introduction

Namibia is located on the south-western coast of Africa between latitudes 17.5° and 29° south and 11.5° and 25.5° east. Namibia borders Angola to the north, Zambia and Zimbabwe to the north-east, Botswana to the east, South-Africa to the south and the Atlantic Ocean to the west. The Kunene, Okavango, Zambezi, Kwando-Chobe and Orange River form part of the borders and are the only perennial rivers in Namibia.

The cold Benguela current along the west coast of the country contributes to the fact that Namibia is the most arid country in Africa, south of the Sahara. Two important physiological features of the country are the Namib Desert, the oldest desert, along the west coast, and the Kalahari Desert along the eastern side. A prominent escarpment runs more or less parallel (north-south) to the coastline and divides the extremely dry coastal plains from the interior. This escarpment has a significant influence on the distribution of the natural fauna and flora. The generally flat Namib plains are periodically interrupted by inselberg mountain ranges, presenting special habitats for fauna and flora. The Kaoko veld in the extreme north-west has high mountain ranges, again presenting special habitats with a high degree of natural animal and plant endemism. The central highland around the capital, Windhoek, rises to 2000m. Another area of importance for natural fauna and flora is the Karstveld and associated mountains around Otavi/ Tsumeb/ Grootfontain. The remainder of the country is relatively flat and sandy in the east and north-east and rocky in the central and southern areas.

Rainfall in Namibia occurs mainly during summer months of December to March. Only the extreme south-western corner may receive rain during the entire year, which has a significant influence on the natural vegetation of the area. The average rainfall pattern forms roughly diagonal NW-SE bands with an average of < 50mm in the southwest and along the coast to > 700mm in the north-east (Caprivi) (Figure 1). Average maximum temperatures during the summer months range from 31°C along the coast and on the central highland to >40°C in the lower lying central south, During winter average minimum temperatures range from <2°C to >10° C along the coast.

The total surface area of Namibia is 824 295km² (Van der Merwe, 1993). The most recent population census figures available (2001) set the population at 1.826 million,

compared to the 1.4 million of 1992 (Table 1.7). The population growth rate is 2.9%, one of the fastest growing populations on the subcontinent. The average population density for Namibia is 2.2 persons /km², but the distribution is skewed. The largest portion of the population is rural and is concentrated around perennial water sources, while the Capital City, Windhoek, has a population of more than 100 000 (est. 240 000), the rest of the urban population being distributed in towns in much smaller than this. Population density is highest in the northern central regions of Omusati, Oshana, Oshikoto and Ohangwena and the north-eastern regions of Kavango and Caprivi where it increases to ± 4 persons/ km². It is also in these areas that rainfall is highest and dry land crop farming is possible.

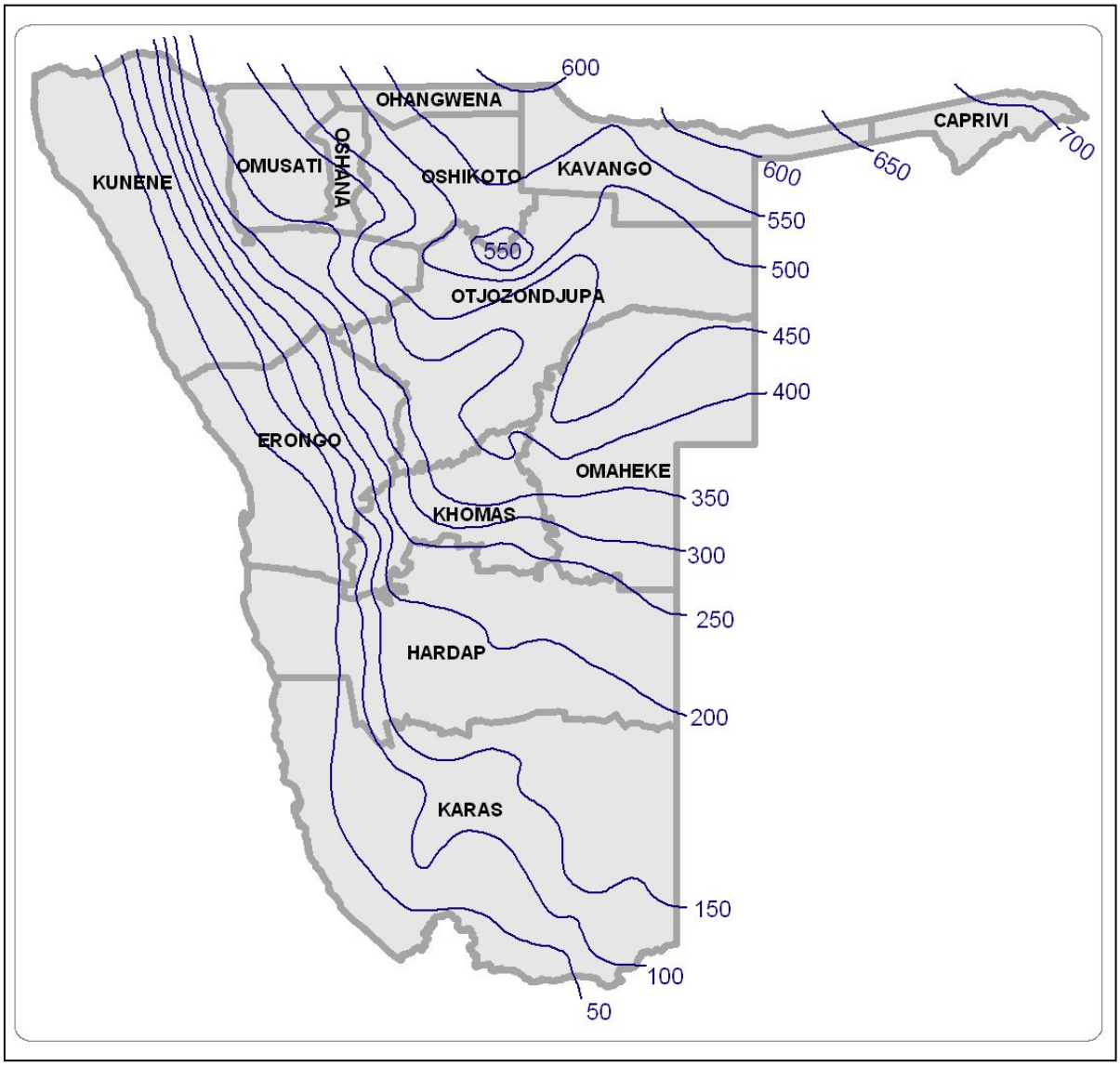

Figure 1: Map of Namibia indicating the regions and the rainfall lines

Agriculture plays a major role in the economy of Namibia, second only to the mining sector in the contributions to exports and GDP (10%). Livestock production (Table 1.1) contributes the most, 8%, to this through the export of beef and mutton to South African and EU markets and to a lesser extent to the DRC and Arabian Markets. Agriculture is the largest source of employment (46%) and the majority of the population (+70%) is dependant on agriculture for their existence. Of the ±82.4 million ha surface area, 15% is not suitable for farming,; 15% of the surface area, mainly in the agriculturally unsuitable areas, is state owned (nature reserves, diamond areas); 44% of the total area is farmed commercially and 41% is communal land (Tables 1.2, 1.3, 1.4 and Figure 2). Only 34% of the available land is suitable for crop farming, but only 1.4% of this is actually utilized, Talbot 1970; Anonymous, 1990; Appo Rao, *et al*, 1991). The largest portion of Namibia is utilized by both commercial and subsistence farmers for livestock farming with the natural vegetation as grazing.

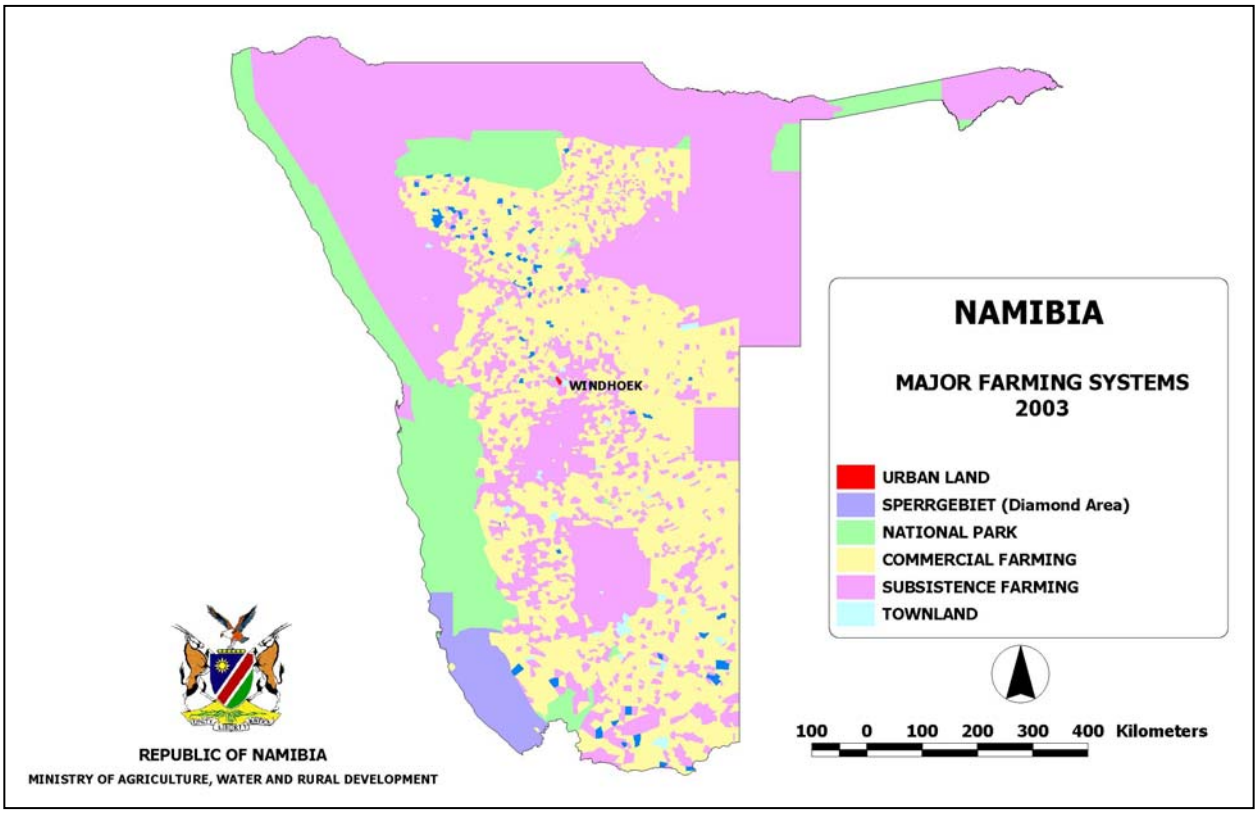

Figure 2: The protected areas and commercial and communal farming areas of Namibia

1.1.2 Livestock Production Systems

Agriculture in Namibia is based mainly on livestock farming. Since the natural vegetation serves as grazing, the type of livestock farmed differs between different areas of the country. In the south mainly sheep and goats are farmed by both the commercial and communal sectors. The average size of commercial farms is 7 500ha (Table 1.5). In the higher rainfall areas in the central and northern areas, cattle are farmed. The average size of the commercial farms here is 4 500ha (Statistiches Bundesampt, 1992), but 7 000ha to 9 000ha is considered an economical unit in these areas (Bester, pers. Comm., 2002).

Livestock numbers for the different species have more or less stabilized around the 2.4 million cattle, 2.4 million sheep and 1.9 million goats (Table 1.6). Fluctuations from this are caused by the variability of the rainfall received.

1.1.2.1 Livestock farming sectors

Livestock production in Namibia can be divided into two types of farming sectors; the commercial farmers, ±4 500, farming on title deed land and the communal farmers, ±120 000, farming on non-title deed land (See Figure 2). Income generated in the commercial livestock sector constitutes approximately 90% of the contribution of agriculture to the GDP.

The commercial producers consist out of the stud breeders, with well organized breeders associations registered with either the Namibia Stud Breeders Association or Studbook in South Africa and the producers who utilize either pure breeds or crosses for beef and mutton production. The Brahman, Bonsmara and Simmentaler are the three most numerous cattle breeds and the Brahman x Simmentaler cross the most popular cross for beef production. The Dorper is the most numerous of the small stock breeds, followed by the Damara, the Boer goat and the different ecotypes of indigenous goats.

Commercial livestock farming can be classified as Medium-input Production Systems. Nutritional shortages of the natural pastures are bridged through the provision of balanced licks and proper animal health management is provided. Mating seasons and selection of breeding stock are implemented to improve production. High-input Production Systems are limited to the small number of dairy, pork and poultry producers.

The communal farming sector is traditionally more subsistence orientated. The annual off take rate in these areas are low, below 6%. This however is changing as farmers realize that livestock are of economic importance. This change in part was brought about by the marketing drive in the communal areas to educate farmers on the economic value of livestock and on which animals to slaughter. The communal farmers in the communal areas south of the Veterinary Control Fence, erected for the control of animal movement between the Northern Communal Areas and the commercial farming areas, for the control of FMD and CBPP, are in fact commercial producers within communal land tenure areas.

Communal livestock production can be classified as Low-input Production Systems. The animals are totally reliant on the available grazing to provide in their nutritional needs. No additional supplements are provided and very little livestock management in terms of health management, selection of breeding stock or controlled breeding is practiced.

(See Annex 1: Tables 2.1 to 2.17 for more information)

1.1.2.2 Livestock production sectors

Livestock production in Namibia can geographically, according to rainfall distribution, be divided into small stock production areas in the south and the large stock and mixed livestock production in the central and northern areas.

1.1.2.2.1 Small stock

Livestock production, both in the commercial and the communal areas, of the southern regions of Namibia is today based on mutton production, using predominantly Dorper sheep and to a lesser extent Black Headed Persian, Van Rooy and Damara sheep and their crosses and goat production with Boer goats. Before the collapse of the Karakul industry in the early 1980's, Namibia produced approximately 4.5 million pelts per annum. With the collapse of the industry, producers were forced to diversify, in order to survive. Most of the producers changed to mutton production, and within five years the small stock industry changed from pelt production to mutton production. This is an example of where market forces brought about a total change within an industry in a very short time. The Ministry of Agriculture, Water and Rural Development maintained herds of black water silk, grey, white, brown and of the original pipe curl type. With the recovery of the industry these herds, together with the few breeders who retained their pure bred studs, played an important role in the provision of breeding material to pelt producers. Namibia currently markets approximately 125 000 – 150 000 pelts per annum.

Most of the mutton produced in Namibia, is lamb, and is currently exported as live animals to South Africa. This however will now change with the decision that value adding has to be done locally. Two small stock abattoirs, complying to EU specifications, are currently operational and a further two small stock abattoirs, designed to EU specifications, are under construction. Namibia's biggest market for goats is in Kwa-Zulu Natal, in South Africa.

A well established and organized stud breeding industry exists, with breeders associations for all the breeds registered with the Namibian Stud Breeders Association.

Small stock production is also found in the drier low rainfall commercial and communal areas of the Erongo and Kunene regions. The farmers keep Damara sheep, Van Rooy sheep, Boer goats and the indigenous goats.

1.1.2.2.2 Large Stock

The central and northern commercial farming areas of Namibia are predominantly used for beef production, utilizing pure breeds, and crosses of the more popular breeds (Brahman, Bonsmara, Simmentaler, Simbra). Beef production in the commercial sector can be divided into two production systems; weaner production and steer production. Weaner production currently constitutes the larger of the two systems. Weaners are sold at auctions and exported live to the feedlots in South Africa. Steers are slaughtered at different ages, depending on breed and area of production. A levy has to be paid for all slaughter animals exported live from Namibia. This is an endeavour to encourage value adding locally. Namibia currently has two EU Certified abattoirs. Small stock is found on many of the beef cattle farms, as a secondary livestock species. Unfortunately the small stock often is not optimally utilized.

In the Northern Communal Areas of Namibia the farmers practice mixed farming; both of livestock species and livestock and crops, in order to be food secure. Predominantly indigenous Sanga cattle, indigenous goats, Damara sheep and chickens are kept.

The dairy industry in Namibia is small and is centred around the Capital City of Windhoek, in the area around Gobabis in the Omaheke region, around Grootfontein in the Otjizondjupa region, Walvis Bay in the Erongo Region, Keetmanshoop in the Karas region, Mariental in the Hardap region and Rundu in the Kavango. The local supply is far outstripped by the demand. The dairy processing industry in Namibia has been granted infant industry status till 2008, to protect it.

1.1.2.2.3 Pig production

The pig industry in Namibia is very small. Of the approximately 30 000-35 000 pigs in the country, approximately 50% are of the indigenous type and are found in the Northern Communal Areas (NCAs) where they are kept under low-input systems.

Only a few commercial piggeries exist in Namibia, mainly around the Capital City, Windhoek, at Swakopmund in the Erongo Region and at Mariental in the Hardap region. Namibia is able to supply in approximately 50% of its pork demand. The establishment of a large commercial piggery, with 500 breeding sows, at Mariental, in the Hardap region, will greatly alleviate this problem once it is in full production.

1.1.2.2.4 Poultry production

Poultry production in Namibia is currently limited to egg production. Currently no broilers are produced in the country. The few commercial egg producers are concentrated around the Capital City, Windhoek, and at Okahandja, a town 70km north of Windhoek and Swakopmund, in the Erongo region.

1.1.2.2.5 Marketing / Supply and demand for Livestock products

Namibia is a net exporter of beef and mutton. Although Namibia has had an export quota to the EU since April 1990, first under the Beef Protocol of Lòme IV, Namibia was granted the following quotas; 1990 (9 600t), 1991 (10 000t) and since 1993 (13 000t). Lòme IV expired during the year 2000, and under the Cotonou Agreement Namibia has a quota of 13 000 t/year to the EU Market. Namibia currently has two cattle abattoirs with EU Certification. South Africa still remains the most important market for the Namibian beef and mutton producers. Most of the livestock exported to South Africa is in the form of; weaner calves to the feedlot industry; sheep to the abattoirs and goats to the traditional markets of KwaZulu-Natal and the abattoirs. Pelts are sold at international auctions. Tables 1.8 and 1.10 present the information regarding livestock production and exports from Namibia.

Approximately 50% of the demand for pork has to be imported from South Africa. This situation will improve once the large scale commercial piggery at Mariental is in operation.

The demand for eggs and poultry meat exceeds the supply by far. Namibia is a net importer of poultry products.

Namibia remains a net importer of dairy products. The local processing industry supplies in 50% of the demand for UHT (long life) milk. The bulk of fresh milk, cheese, cream and yogurt is imported from South Africa.

1.2 Other agricultural sectors

Agronomy plays a minor role in the Namibian agricultural sector, in terms of its contribution to the GDP, but a larger portion of the population is involved with crop farming than livestock farming. Commercial crop production is only possible in the north and north-east where rainfall is sufficient or at the few small irrigation schemes where water is available. In the north-central and north-eastern regions, where rainfall is sufficient, subsistence crop farming has always been practiced. Between 120 000 and 150 000 subsistence farming units practice one or other form of mixed farming. Crops are produced by both the commercial and communal farming sector. The main crops are pearl millet, sorghum, maize, wheat, beans, alfalfa and some fruit and vegetables (melons, grapes, tomatoes). In the subsistence sector field sizes vary from 0.2 – 100ha, but farmers typically cultivate 2 – 4ha (J. Matanyare, pers. comm. 2002), mainly with pearl millet, sorghum or maize, or a mixture of these crops, and other minor but important crops such as bambara nuts, ground nuts, cowpeas and melons. Yields for subsistence farmers of pearl millet very from 100 – 900kg/ha. A small number of commercial farmers produce crops in areas such as the “Maize Triangle” (Otavi – Tsumeb – Grootfontein), Hardap Irrigation Scheme, Stampriet area and the Noordoewer Irrigation Scheme. The average hectarege cultivated by these farmers varies from 4 – 5 000ha. In the Maize Triangle lands are almost exclusively under maize production, with

sunflower, cotton and dry beans as diversified crops. The smaller farms on the irrigation schemes are more diversified with crops such as wheat, grapes, sweet melons, water melons, tomatoes, alfalfa, cotton and other vegetables.

1.2 The State of Conservation of Farm Animal Biological Diversity

Namibia is blessed with a rich variety of livestock species and breeds within species, both local/ native, locally adapted – introduced over a long period of time, and recently introduced (See also Annex 1: Tables 3.1 and 3.2 and Tables 5.1 –5.5).

1.2.1 Species and breeds present in Namibia

Cattle: Local breeds: Four ecotypes of Sanga cattle (Kunene, Ovambo, Kavango, Caprivi
Locally adapted breeds: Afrikaner, Aberdeen Angus, Brahman, Bonsmara, Braunvieh, Charolais, Dexter, Friesian, Gelbvieh, Hereford, Jersey, Nguni, Pinzgauer, Santa Gertrudis, Simbra, Simmentaler, Sussex, Shorthorn, Tuli
Recently introduced breeds: Beefmaster, Limousin,

Sheep: Local breeds: Damara, Karakul types developed in Namibia
Locally adapted breeds: Blinkhaar Afrikaner, Dorper, Van Rooy, Black Headed Persian,
Recently introduced breeds: Dohne Merino, Ile de France, S.A. Merino, Lettelle,

Goats: Local breeds: Four ecotypes of indigenous goats (Kunene, Ovambo, Kavango, Caprivi)
Locally adapted breeds: Boer goat, Saanen
Recently introduced breeds: Angora, East African Dwarf goat

Pigs: Local breeds: One type of indigenous pig
Locally adapted breeds: Landrace, Large White
Recently introduced breeds: Duroc

Poultry: Local breeds: Indigenous chickens
Locally adapted breeds: Black Australorp, Old English Game, Indian Game, Orpington, Rhode Island Red, Koekoek, Bantam Silkies, White Leghorn, Moscovy ducks, Pekin ducks, Geese
Recently introduced breeds: Hi-line

1.2.2 Conservation efforts

1.2.2.1 Cattle

Currently no cattle breed in Namibia is at risk of extinction, not even the breeds with very limited numbers of breeding animals, for sufficient numbers are available in South Africa or in the different countries of origin. Of concern however is the indiscriminate crossbreeding happening in the communal areas, where bulls of exotic breeds, not adapted to the prevailing production environment, is crossed with the indigenous Sanga cattle in an effort to improve the size of the animals. It is perceived by many communal farmers that the indigenous cattle are inferior, because they are of a small frame size.

The Directorate of Agricultural Research and Training (DART) currently have herds of different ecotypes of indigenous Sanga cattle at three research stations; Sonop, Sandveld and Omatjenne, where they are used for *ex situ in vivo* conservation purposes. These herds are also used within research projects to evaluate their reproduction and production potential. DART is further more involved in the development of four livestock development centers in the Northern Communal Areas; Sachinga in the Caprivi region, Mile 46 in the Kavango region, Okapya in the Oshikoto region and Oshaambelo in the Omusati region. These centers will be used for; (1) *in situ* conservation, (2) livestock improvement programmes, (3) provision of breeding animals to the farmers and (4) farmer education.

DART is involved with the Meat Board of Namibia and some of the breeders associations in a Joint Venture Programme of livestock improvement in the Northern Communal Areas (NCAs). Breeding bulls are sold to the farmers at subsidized prices. The indigenous Sanga bulls used thus far in the programme all originated from the DART herds.

With the financial assistance of the SADC/UNDP/FAO Regional Project for the Management of Farm Animal Genetic Resources it was possible to carry out a study on the genetic characterization of the indigenous Sanga cattle ecotypes using micro-satellite markers. This was done in collaboration with the Irene Animal Production Institute in South Africa. For the other cattle breeds present in Namibia, genetic characterization information is available from studies carried out either in South Africa or in their countries of origin. With the financial assistance of the above project, a breed's survey was executed in Namibia during 2002.

A number of studies were completed in Namibia where the reproduction and production potential of the different breeds were evaluated, under the existing local environmental conditions to determine their suitability/ adaptation for production.

Breeders associations exist for all the breeds; local, locally adapted (introduced breeds) and the recently introduced breeds and are affiliated to the Namibian Stud Breeders Association. Performance testing is becoming compulsory for all the breeds.

Since the late 1960's a Beef Cattle Performance Testing Scheme, run by the Ministry, is available in Namibia. This scheme consists of different phases, collecting pedigree information, reproduction, growth and performance data. Since 2000 breeding values are also available. Since 2001 Breed Plan is also in operation in Namibia. The services provided by the Performance Testing Schemes are more orientated towards the stud breeding industry, but other producers may also participate. A milk recording scheme is operational in Namibia.

Information regarding all registered animals is available from the Performance Testing Schemes, both Breed Plan managed by the Namibia Stud Breeders Association and the National Beef Cattle Performance Testing Scheme managed by DART, regarding pedigrees, performance and breeding values. Some of the information is available on the internet while others are available on request.

1.2.2.2 Sheep and goats

Of the sheep breeds currently found in Namibia, none is at risk. Although the numbers of the wool sheep breeds have decreased drastically, these breeds are not at risk for sufficient numbers are available in South Africa, from where these breeds were originally imported.

Although the numbers of the Karakul sheep declined drastically after the slump in the industry in the early 1980's, sufficient numbers are still available and the industry is healthy. In the NCAs uncontrolled crossbreeding of the indigenous goats with Boer goats are on the increase, due to the demand for larger carcasses. This is a concern, for the environment is not able to sustain the larger framed animals with their higher nutritional needs. Goats are often traded when money.

DART has an ongoing project at Uitkomst Research Station where herds of the four ecotypes of indigenous goats are used in an evaluation project. The objectives of the project is to determine; (1) reproduction potential, (2) production potential (growth rate and yield), (3) milk yield, (4) carcass characteristics and to serve as (5) *ex situ in vivo* conservation herds. The Boer goat, an established and adapted breed, is used for comparison.

At Omatjenne a herd of Damara sheep was established during the 1960's. This herd was used to establish reproduction and production parameters for the breed and is used for the provision of breeding material to breeders and producers and the training of farmers.

Since the importation of the first Karakul sheep into Namibia during 1907, the government has played a pivotal role in the industry; (1) in the development of the different pelt colour types, (2) the development of the water and shallow water silk pelt types, (3) the provision of breeding material to the industry, (4) training of farmers and (5) the conservation of the Karakul after the slump in the industry during the early

1980's. At Gellap Research Station nucleus herds of white, grey, black water silk, brown and the original pipecurl type of Karakul sheep are maintained. A very complete data base, dating back to the 1940's, is available at the Karakul Breeders Association. The pelt of each of the lambs born is described on a prescribed form, and two photos are taken of the lamb. This is attached to the completed form and stored. Until 2002 DART managed a Karakul Progeny Testing Scheme for the evaluation of Karakul rams. This was first done under intensive conditions at the Hardap Karakul Testing Centre and later under extensive grazing conditions at Kalahari Research Stations. It was terminated due to a lack of suitably trained staff.

DART started a programme of assisting the communal farmers of the south of the country to improve the quality of the pelts produced through the provision of high quality rams in a lending scheme. The pilot project was a success and the concept was taken over by the Karakul Breeders Association, who now provides high quality rams to the communal farmers at subsidized prices. The quality of the pelts produced in this area has improved, with a resultant increase in income per pelt for the producers. This programme will continue.

With the financial assistance of the SADC/UNDP/FAO Project on the Management of Farm Animal Genetic Resources, the four ecotypes of indigenous goats were genetically characterized using micro-satellite markers. This was done in collaboration with the Irene Animal Production Institute in South Africa. During 2002 Irene Animal Production Institute published the results of the genetic characterization study carried out for all the small stock breeds of Southern Africa. Under the mentioned programme the sheep and goat breeds were also included in the breeds survey carried out during 2002.

Although there is a performance testing scheme available for small stock, it is not operational. DART has an official veld ram test at Kalahari Research Station, where breeders may send their rams to be evaluated under natural grazing conditions, for growth and adaptation. The Damara, Dorper, Van Rooi, Black Headed Persian and Boer goat breeders currently participate in the test.

1.2.2.3 Pigs

The pig industry in Namibia is very small. At least 50% of the total pig population is indigenous pigs, kept under low-input systems were they have to scavenge for food, the remainder are Landrace, Large White, Duroc and their crosses. With the exception of the pigs in the small number of commercial piggeries (50 – 100 sow units), kept under high-input systems, the rest are kept by farmers under low and medium-input systems.

During 1996 DART started a small nucleus herd of indigenous pigs at Mashari Agricultural Development Centre. This herd was used to evaluate the reproduction and production potential of the indigenous pigs under improved management conditions and the provision of selected breeding material, through the breeding programme, to farmers.

With the financial assistance of the SADC/UNDP/FAO Project on the Management of Farm Animal Genetic Resources, the genetic characterization of the indigenous pigs, using micro-satellite markers were done with the assistance of the Irene Animal Production Institute. The genetic characterization of the pig breeds of Southern Africa was done by Irene Animal Production Institute.

There is no stud breeder of pigs in Namibia. Breeding material, mostly boars, are imported from South Africa. There is no performance testing scheme for pigs in operation in Namibia.

1.2.2.4 Poultry

Poultry is found on farms, commercial and communal, throughout Namibia and are kept predominantly under free range conditions. The Industry as such is very small and only produces eggs, no broilers. In the communal areas chickens are often the only type of livestock owned and is frequently traded when money is needed. Due to the ease of transport large numbers of exotic chickens have been introduced into the communal areas, and were allowed to cross with the indigenous chickens. This is of great concern to DART.

During 1996 a chicken improvement project was started at Mashari Agricultural Development Institute. With the assistance of Dr. Joep Joubert from South Africa, an expert on poultry, indigenous chickens were acquired from rural farmers in the North Central and Kavango regions, and from a small flock of Ovambo chickens at Irene Animal Production Institute. These birds formed the nuclei of breeding flocks of indigenous chickens from two different areas of Namibia; North Central and the Kavango. Eggs were collected daily and hatched in an incubator. The chicks were raised till the age of seven weeks when they were sold to the local farmers. These chickens are in high demand. All data is collected to evaluate the production potential of these chickens.

The pure bred exotic breeds are kept and bred by devoted poultry lovers who are members of poultry clubs.

No genetic characterization of the indigenous chickens of Namibia has been done, largely due to the fact that the extent of crossbreeding with exotics is not known.

Chicken breeds were included in the breed’s survey completed during 2002.

1.3 The State of Utilization of Farm Animal Genetic Resources

In the commercial and communal farming sectors all the breeds mentioned in 1.2.1 and their crosses are used for livestock production.

1.3.1 Cattle

In the Northern Communal Areas cattle are multi-purpose animals. They are of cultural importance and are used for the provision of milk to the household, draught animal power for cultivation of the fields and as a source of risk management, especially during times of drought or unforeseen large financial expenses. The drive to promote marketing of livestock in order to increase the annual off take, and thus relieve the pressure on the natural resource base is bearing fruits. The farmers are realizing that livestock/cattle has direct economical/financial value. Communal farmers own approximately 67% of the cattle population, but contribute only 8% to the agricultural GDP derived from livestock production. Most of them own indigenous Sanga cattle, or their crosses, which constitute approximately 50% of the total cattle population. No controlled mating, nor breeding seasons are used in the communal areas. Very little selection for fertility, production or livestock improvement is practiced.

In the commercial farming sector, farming is a business, and is practiced for financial benefits. The most populous breeds are the Bonsmara, Brahman and Simmentaler. The most widely used cross for the production of weaner calves is the Brahman x Simmentaler. With admission to the Lome Convention IV, and the demand for heavier carcasses for the export market, breeds such as the Limousin, with its higher growth rate and lean carcass, gained in popularity.

Performance testing is becoming compulsory for more and more breeds, with the concomitant individual identification and record keeping. All the breed societies in Namibia have breeding strategies in place. The use of controlled breeding seasons is the norm in the stud industry and widely practiced in the commercial herds. Artificial insemination is widely used in the dairy industry, but not in the beef cattle industry. It is predominantly used in the stud industry and very little in the commercial beef herds, mainly due to the extensive nature of production in Namibia. Multiple ovulation and embryo transfer methodologies have only been used on a very limited basis in the stud industry, mainly due to the absence of an AI and MOET Centre in Namibia and the poor availability of liquid nitrogen. Through participation in the performance testing schemes available, breeders are receiving Estimated Breeding Values (EBVs) for different traits for their animals. The uses of breeding values in the individual breeding plans of stud breeders are slowly gaining momentum.

1.3.2 Sheep and Goats

The commercial small stock farmers and the communal farmers of the southern regions farm predominantly with Dorper, Van Rooi, Black Headed Persian, Karakul sheep and their crosses and Boer goats. The Dorper is the most numerous. Sheep is predominantly kept for meat and pelt production. A small, highly skilled processing industry for Karakul pelts, exist in Namibia. A small amount of Karakul wool is produced which is used by the local weaving industry for the manufacturing of Karakul carpets. A small amount of fine

wool is produced by a dedicated group of woolled sheep farmers. The whole clip is sold on the South African Market.

The numbers of Angora goats have declined over the past number of years, mainly due to poor prices received and the high cost of transport to the South African Markets. Boer goats are used for the production of goat meat, both for the local market and the South African market. Goats are exported alive to South Africa. Goat milk is used at household level in tea and for drinking by the children. A small population of Saanen goats are found in Namibia, but are not used for goat milk, and its associated products' production.

Open and controlled mating seasons are used. AI is used in the Karakul stud industry, but seldom in the commercial herds and not at all in the communal herds. This is due to the extensive nature of production and the fact that liquid nitrogen is not freely available.

Breeders associations exist for all the small stock breeds and are registered with the Namibian Stud Breeders Association. Although a performance testing scheme does exist for small stock, it is not utilized by the industry.

1.3.3 Pigs

Pig production in Namibia is predominantly based on low-input systems, with a small number of commercial piggeries utilizing high-input systems, which produce pork for the local market. In the Northern Communal Areas the farmers keep the highly adapted indigenous pigs and the commercial producers use Large White, Landrace, Duroc and their crosses for pork production. Most of the pork produced locally are produced from F1 cross sows, mated to pure bred boars.

Producers use natural mating, no AI is used in the industry. There is no performance testing scheme in place for the pig producers, nor any breed societies. The commercial producers are however organized into a Pig Producers Organization, which is affiliated to the Livestock Producers Association.

1.3.4 Poultry

Poultry production in Namibia is limited to egg production by a small number of laying units, varying from 8 000 – 20 000 birds. No broiler production unit is in existence in Namibia. Pullets are imported at point of laying and the culled layers are sold as live birds. High-input systems are used, utilizing specialized, commercially developed F1 crosses. No performance testing scheme for poultry is available in Namibia.

Exotic breeds are bred by individuals who breed the birds as a hobby. They belong to different poultry clubs.

(See also Annex 1: Tables 4.1 – 4.9 for more information)

1.4 The Major Features and Critical Areas of Animal Genetic Resources Conservation and Utilization

Within the communal farming community a perception exists that the Sanga cattle and the indigenous goats with which they farm, are inferior animals. This is based on the fact that when the communal farmers visit Agricultural Shows, they are shown the large framed, fattened animals being exhibited. Thus the communal farmers wish to breed larger animals and demand higher prices for their animals at the abattoirs, not understanding livestock marketing and pricing.

To rectify this matter a few issues need addressing;

1.4.1 Farmer Education

As the communal farmers are the custodians of the indigenous livestock of Namibia, it is of utmost importance that they should be educated concerning (1) the role of indigenous animals in the livestock industry, (2) livestock management – for the old traditional methods have not kept track with the changing environment, (3) marketing and the factors that influence prices. They need to be taught that livestock improvement does not mean crossbreeding, but improving of the existing animals through the use of selection and breeding.

The farmers should be educated regarding the effect of indiscriminative crossbreeding on the genetic resource base, and the fact that the crosses have higher nutritional needs than the indigenous animals. They will thus further increase the pressure on the natural grazing. If sufficient feed is not available, they will produce poorer than the indigenous animals

1.4.2 Livestock Improvement

The development and completion of the four planned Livestock Development Centres is a priority. These centers are needed (1) for the training / education of the farmers and (2) for the livestock improvement programme of DART. At these centers herds of indigenous livestock will be kept in breeding programmes to supply breeding material to the farmers.

PART II.

The Changing Demands on National livestock Production and their Implications for Future National Policies, Strategies and Programmes related to AnGR.

2.1 Review of Past Policies, Strategies, Programmes and Management Practices (as related to AnGR)

Namibia still uses legislation inherited from the Republic of South Africa. Some of the legislation has been amended, since Independence in 1990, to suit the Namibian situation. There however exists a need for Namibian legislation regarding the management of farm animal genetic resources.

Farm Animal Genetic Resources are guided by the Livestock Improvement Act (Act 25 of 1977), legislation inherited from South Africa. It was amended in 1993, the Livestock Improvement Amendment Act (Act 25 of 1993). The Namibia Stud Breeders Association was established and operates under this act. The Karakul and Wool Act (Act 14 of 1986) governs the karakul and wool industries as well as the import and export of genetic material from the country. The National Agricultural Policy creates a conducive framework for any of the agricultural ramifications to thrive and prosper. The National Drought Policy and Strategy provides for the conservation of breeding material to ensure that adequate reproductive capacity is maintained during periods of disaster droughts.

The Performance Testing Schemes currently in use in Namibia, BreedPlan and the National Beef Cattle Performance Testing Scheme are predominantly orientated towards the needs of the stud breeding industry. The National Beef Cattle performance Testing Scheme, as implemented by the Directorate of Agricultural Research and Training is making an effort to expand the scheme also to the commercial beef producers as well as the emerging commercial farmers and communal farmers to improve their livestock management skills. None of the small stock pig and poultry Performance Testing Schemes are currently implemented in Namibia. Under the BreedPlan Scheme there exists the possibility for any of the producers within these industries to participate.

Commercial beef producers utilize natural mating; either single or multiple sire for reproduction purposes. AI is not widely used in the commercial sector. In the stud industry natural mating; single sire or hand mating are the most widely used practices. Artificial Insemination (AI) is used to a limited extent. Embryo transfer technology has only been used to a very limited extent with the importation of embrios from abroad. Currently a private embrio center is being established. The main reason for the limited use of AI is the problems experienced with the reliable supply of liquid nitrogen in rural areas. The dairy industry utilize AI to a much higher degree than the beef industry, mainly due to the fact that very few high quality bulls are locally available and the fact that high quality semen is available from South Africa.

The export of slaughter animals to the abattoirs in the Republic of South Africa used to be the main marketing channel for Namibian beef producers. This has changed; Namibia currently exports approximately 500 000 weaner calves to the feedlots in South Africa. The producers' environment has changed from traditional ox production to predominantly weaner production. Since 1990 Namibia has marketed beef on the international market. Namibia currently has an export quota for 13 000 tons of de-boned beef to the markets of the European Union (EU). Marketing to the EU markets started under the Beef Protocol of Lome IV in 1990, with an annual quota of 9 600t, which was increased to 10 000t for 1991-1992, and since 1993 it is fixed at 13 000t. Since 2000 meat is marketed under the Cotonou Agreement which will end in 2007.

Livestock production in the commercial beef production areas of Namibia is based on the use of adapted livestock; indigenous and locally adapted breeds and their crosses. In the northern communal areas livestock production is based on the use of the local indigenous breeds, while in the communal areas south of the Veterinary Control Fence it is based on crossbred animals.

Too much emphasis is placed on individual production traits, both in the commercial and the stud industry - growth traits such as average daily gain (ADG) is emphasized. Emphasize should shift towards efficiency of production and the factors affecting efficiency of production. Fertility and production per unit area (kg/ha) should be increased without the degradation of the natural pasture.

Over grazing of the natural pastures has resulted in approximately 20 million hectares of pastures being lost to bush encroachment. Condition of the pastures has deteriorated and only small areas exist where the pastures are in a climax condition. For most of the country the carrying capacity has decreased drastically. Serious measures are needed to restore the condition of the pastures, but also to sensitize farmers to the need for sustainable farming practices. The Soil Conservation Act needs to be revised and enforced to prevent further degradation. The condition of the natural pastures in the communal areas is also poor; due to high human and livestock population densities. Marketing of livestock in communal areas should receive more attention. The proposed movement of the Veterinary Control Fence will hopefully assist in achieving the goal of increasing the annual off take of animals through marketing.

2.2 Analysis of Future Demands and Trends

The Karakul Industry experienced a slump between 1982 and 1999. After the high of the 1970's, when Namibia produced approximately 4.5 million pelts per annum, pelt production, due to the low pelt price dropped to below 100 000 pelts per annum. The increase in the demand for pelts on the world markets has lead to a revival of the Karakul Industry. Currently Namibia produces approximately 250 000 high quality pelts. The revival of the industry has lead to a demand for high quality breeding material, both from commercial and communal pelt producers. To assist the communal producers, who are not able to afford the prices paid for rams at auctions, the Ministry of Agriculture, Water

and Forestry (MAWF), the Karakul Board and the Namibian Stud Breeders Association has implemented a joint program to assist the communal farmers. A subsidy system was implemented whereby the MAWF pays 65% of the price and the farmers 35%.

High input costs have forced producers to look at “low input breeds” for production. The demand for indigenous livestock and locally adapted breeds eg. The Damara, Karakul, Bonsmara, Simbra and Nguni/Sanga have increased. The demand from outside Namibia for Namibian genetic material from these breeds, has increased, especially from Angola, South Africa and Mozambique.

As the emphasis of the communal farming sector changes from subsistence farming to market orientated production, the need for the implementation of a record keeping system will arise. The MAWF has foreseen this and has changed its approach to performance testing to actively promote participation in performance testing under emerging commercial farmers.

Due to indiscriminate crossbreeding with poorly adapted breeds in the communal areas, genetic degeneration is increasing. To counter the Directorate of Agricultural Research and Training (DART) is implementing a livestock improvement programme. Four livestock development centers are currently being established; two are operational already, where selected breeding material of the indigenous livestock will be provided to communal farmers at subsidized prices. These centers will also serve as training centers where farmers will be trained in livestock management.

The demand for marketing of beef from north of the Veterinary Control Fence (VCF) is increasing. To facilitate this MAWF is currently implementing a ten-year plan to move the gradually north to the Angolan border. The success of this initiative will also depend on the success of the Angolan Government to control animal diseases in Angola, especially CBPP and FMD.

Namibia needs to streamline its policies, bills and acts dealing with livestock. It needs to develop its own Livestock Improvement Policy, Livestock Improvement Act, Livestock Marketing Act and the National Agricultural Research Plan needs to be revised. Other older pieces of legislation inherited from South Africa needs to be reviewed and amended where necessary.

Namibia being a beef export country has to comply with the regulations of the international markets. For marketing in the EU, Namibia has to comply with the prescribed regulations regarding traceability of the beef. An acceptable system is currently being implemented and is managed by the Meat Board of Namibia.

Namibia is a net exporter of beef and mutton. Most of the meat is exported in the form of live animals to South Africa or as carcasses and cuts. In an effort to stimulate local processing of meat prior to exporting, the government has implemented a system of export levies on live animals.

2.3 Alternative Strategies in the Conservation, use and Development of AnGR.

The genetic degeneration of indigenous livestock in the northern communal areas is a concern to MAWF. Communal farmers are of the opinion that the small framed indigenous Sanga cattle are inferior to large framed animals. Unfortunately the northern communal areas have been seriously overgrazed and cannot sustain large framed animals. Furthermore the introduced breeds are nor well adapted to the existing environmental conditions and levels of livestock management. Results from research projects executed in Namibia, where indigenous animals were included, used to indicate to communal farmers that indigenous livestock are not inferior and that they are well adapted to the local conditions. Even though the small framed Sanga cattle produce smaller carcasses, they are biologically more efficient than the large framed breeds. The establishment of the four livestock improvement centers in the northern communal areas will assist in this regard as will the provision of improved breeding material at subsidized prices.

The Karakul Improvement initiative will be expanded to enable more of the communal farmers from the southern communal areas of Namibia to participate. Karakul pelt production is a more viable production option for these farmers than mutton production. They do not experience the transport problems associated with the marketing of mutton sheep or goats. Though Namibia will never reach the production of the late 1970's and early 1980's it has a secure market for high quality Karakul pelts. The type of pelts produced; shallow water silk and silky, are highly sought after.

The need exists for the revision of the National Agricultural Research Plan (NARP) which was developed in 1995. The Livestock Improvement in the Northern Communal Areas Project and the conservation of indigenous livestock need more prominence in the new NARP.

Namibia has a Biodiversity Task Force that manages the biodiversity activities of the fourteen different working groups, of which agriculture is one, within country.. A Biosafety Policy was developed and is in place and the Biosafety Act is ready for presenting to Parliament. Legislation is currently being prepared on access to traditional knowledge and genetic material, but does not include livestock. This remains a problem – why should there be separate legislation; one for plants and one for livestock when the needs of both could be served by a single document.

2.4 Future National Policy, Strategy and Management Plans for the Conservation, Use and Development of AnGR

Under the umbrella of the National Agricultural Policy a Livestock Improvement Policy needs to be developed as soon as possible. The existing legislation inherited from South Africa will have to be reviewed and amended to suite the needs of Namibia. The conservation strategies and plans for indigenous livestock must be formalized.

Agriculture has to take its rightful position in the Biodiversity Strategy. This will only be possible through the active marketing of the importance of agriculture and the role it plays in food security and biodiversity. In the case of FAnGR the role of livestock in biodivesiry, food security, income generation and sustainable agriculture will have to be emphasized. This will need the support of management in the ministry.

The Performance Testing Office within DART will have to expand in order to reach an even larger section of the farming population. It will have to expand to include the different sectors within the livestock industry.

The need for more persons trained in the management of farm animal genetic resources exists. The current establishment of DART does not provide enough positions to carry out the necessary research and to provide the necessary advice and backup as is needed.

PART III

State of National Capacity and assessing Future Capacity Building Requirements

3.1 Assessment of National Capacity

There exists four institutions of higher education in Namibia, that provide training in animal production; the University of Namibia (UNAM) which provides general training in livestock production, the Polytechnic of Namibia which provides training for a three year diploma in general agriculture and a B. Tech degree orientated towards agricultural management. The Neudam and Ogongo Agricultural Colleagues provide training for a three year general diploma in agriculture. No post graduate school in agriculture exists at UNAM. Any post graduate qualification is given in cooperation with another university. No specialist training in any of the livestock subjects is available in Namibia.

Though there are about 150 graduates in Namibia with degrees in animal science, only an estimated 25 have Masters or Doctorates, and very few of them are practicing scientists. Specialists in animal genetics and breeding are limited.

Due to the high cost of establishing and maintaining a high tech laboratory, as well as the need for sufficient numbers of appropriately trained staff to run such an establishment, Namibia does not have a genetic laboratory. When the services of such an establishment are needed, the services of laboratories in South Africa are called upon.

The DART delivered the service of an Animal Recording Service in the form of the National Beef Cattle Performance Testing Scheme since the late 1960's to the stud breeders in Namibia. During the 1980's this service was expanded to interested commercial beef producers. A weakness of the system has been the limited number of staff. When the Namibian Stud Breeders Association signed on BreedPlan as their official service provider for animal recording during 2001, a number of breeds joined BreedPlan and the rest stayed with DART. The NSBA suffers the same problem as DART – not enough staff to provide service to the clients.

The Livestock Research Division has a limited number of researcher positions, researchers who has to serve the needs of the whole livestock industry. The limited number of researchers means that it is not possible to buy specialized livestock computer software, for it needs a dedicated operator. With the emphasis being placed on Farming Systems Research and Extension, it is difficult to provide the necessary support to the management of farm animal genetic resources. DART has sufficient livestock research facilities. All researchers have access to e-mail and internet.

Two veterinary surgeons in Namibia are currently equipped to collect semen and produce straws. No AI or Embryo Transfer Station is registered in Namibia. The provision of

liquid nitrogen remains a problem outside the capital. Currently a private breeder is establishing an Embryo Transfer Center on his farm.

3.2 Assessment of Future Capacity Building Requirements

There exists a need for streamlining legislation in Namibia. Policies need to be developed for livestock improvement and the management of farm animal genetic resources. Existing legislation which was inherited from South Africa need to be reviewed and amended where necessary.

A forum is needed where different ministries that enforce legislation dealing with livestock can communicate in order for streamlining of legislation.

As Namibia does not have the funds nor the human capacity to establish high tech laboratories, it is important that official bilateral agreements be signed with institutions with the necessary capacity.

Training at all tertiary institutions providing training in animal production needs to be improved to provide products needed in the industry and not only generalists. The MAWF needs to invest in the post graduate training of staff in the field of animal genetic resources, especially animal genetics and breeding.

PART IV.

Identifying National Priorities for the Conservation and Utilization of AnGR.

4.1 National Cross-cutting Priorities

Although UNAM is a young university it is important that the curriculum be changed to fulfill the needs of the industry, which is not for more generalists, but for people with more specialized training in animal genetics, animal breeding and animal nutrition.

Although ABS is not such an issue in farm animals there exists a need for the control of exporting genetic material of indigenous breeds from communal areas to prevent the exploitation of the livestock owners. The need exists for the recording of traditional knowledge of the different ethnic groups in Namibia. The danger exists that it will be lost due to the younger generation not being interested in returning to farming, and those with the knowledge and who use it to earn a living being scared that sharing their knowledge will loose them their income.

The awareness of the public on the importance of farm animal genetic resources for food security and biodiversity should be raised. This should be done through a long term awareness programme which includes farmer education, sensitizing of school children and the general public.

The current livestock improvement initiatives of DART; the development of the Livestock Development Centers, the training of communal farmers in livestock management, the bull- and ram schemes need to be strengthened. More staff is needed to reach the objectives of improving the quality of the livestock and the management skills of the communal farmers.

Namibia is traditionally a meat producing country. An aspect that has been neglected is value addition, especially at household level in the communal areas. Possible fields that could be addressed are; (1) the curing of meat (and fish in the Kavango and Caprivi), which will enable them to keep meat longer, (2) small scale processing of milk into yoghurt, and cheese will improve the nutritional value of milk and provide farmers with a product that can be sold to generate an income, (3) small scale tanning of hides and skins and (4) the production of leather goods from locally tanned hides and skins. DART does not have the personnel to do this and will need outside assistance in this regard.

4.2 National Priorities among Animal Species, Breeds, Country's Regions and Rural Communities.

It is important that a Livestock Improvement Policy and a Farm Animal Genetic Resources Management Policy be developed and implemented. All inherited legislation should be reviewed and either amended, scrapped or redrafted to suite the specific needs of Namibia.

The ram scheme in the southern communal areas should implement a monitoring system through which the impact of the rams that are provided can be evaluated. The monitoring system implemented for the bull scheme in north central, should be expanded to cover all the northern communal areas.

The impact of the bull and ram schemes can be increased if breeding strategies, to obtain the best results with the animals provided, are introduced. The best possible means of accomplishing this will be through mobilizing of communities to get them involved in Community Based Management of Farm Animal Genetic Resources.

It is a priority for DART to complete the development of the LDCs in the northern communal areas and to have them operational as soon as possible. With donor funding a training manual, for communal farmers, on livestock management and animal health control are being developed This will be used for the training of communal farmers at the LDCs. These LDCs can have a large impact on livestock improvement in the northern communal areas.

The activities of the Performance Testing Office need to be expanded to all communal areas. As livestock identification (branding) is compulsory in Namibia, individual animal identification should be introduced as well. Basic data collection on reproduction and marketing will provide valuable information, both for scientists and for decision makers.

Under the SADC/UNDP/FAO Regional Project on the Management of Farm Animal Genetic Resources, Namibia was able to complete the genetic characterization of the four indigenous Sanga cattle ecotypes, four indigenous goat ecotypes and the indigenous pigs. This should be expanded to include the indigenous chickens, which will be very difficult, due to the amount of crossbreeding that has taken place and also the different Karakul types. As the original characterization was done with the minimal amount of samples as prescribed, it would be good if a larger sample, from a larger area could be analyzed together with the original data and with 25 primers, as is prescribed by the FAO. For this exercise funding will have to be sourced.

PART V.

Recommendations

For Farm Animal Genetics Resources to have the necessary impact in the livestock industry, and to assist in achieving the objectives of Vision 2030, Namibia's vision to be at the level of people living in developed countries, by 2030, it is recommended that the following should be in place as soon as possible.

1. The necessary policies for livestock improvement and the management of farm animal genetic resources be developed and implemented.
2. All currently used legislation be reviewed and amended or redrafted where necessary in order to serve the Namibian Livestock Industry.
3. Human capacity in the field of AnGR be developed within the country.
4. The qualifications of tertiary institutions in the field of agriculture, and specifically AnGR, be tuned towards the needs of the industry. Post graduate studies of staff should be promoted, and supported where possible.
5. Training of communal livestock farmers should be a high priority, not only of MAWF, but for all sectors and institutions dealing with the communal farming sector, not only in the field of animal husbandry but also in the role of indigenous livestock in food production and the conservation of biodiversity.
6. International co-operation agreements should be signed with institutions within the region, who can assist with (1) analysis of large data sets where the ministry do not have the capacity, human, software or hardware, (2) genetic characterization of livestock, (3) development / training of staff in AnGR, (4) assist with cryo-preservation of semen, ova and embryos of indigenous livestock and (5) with the development of breeding strategies for the conservation of indigenous livestock.
7. The current data bases and information systems for livestock should be improved and expanded to include more data from the commercial and different communal farming areas. Access to information should be readily available and more user friendly.
8. The communal farmers in the northern communal areas of Namibia are by large the custodians of the indigenous livestock in Namibia. They should be educated on the importance of (1) indigenous livestock in the industry, (2) the adaptability of the animals to their respective environments and the importance of their livestock to food security. As Namibia cannot afford the establishing and maintenance of a cryo-preservation unit, conservation of indigenous livestock should be through utilization.
9. Funds to carry out the above mentioned activities are limited on the recurrent budget. External sources of funding will have to be sourced from international donor organizations.

PART VI.

Other Elements of the Report

6.1 Executive Summary

Namibia is located on the south-western coast of Africa and borders Angola to the north, Zambia and Zimbabwe to the north-east, Botswana to the East, South Africa to the south and the Atlantic Ocean to the west. Namibia receives its rainfall mainly during the summer months. The average rainfall patterns forms roughly diagonal NW-SE bands with an average of < 50mm in the southwest and along the coast to >700mm in the north-east (Caprivi). This has a significant influence on the natural vegetation of the country. The total surface area of Namibia is 824 295km^2 and a population of 1.826 million people.

Agriculture plays a major role in the economy of Namibia, second only to the mining sector in the contributions to exports and GDP (10%). Livestock production contributed the most to the GDP (8%), through the export of beef and mutton to the South African and EU Markets. Agriculture is the largest source of employment (46%) and approximately 70% of the population is directly or indirectly dependant on agriculture for their existence.

Agriculture in Namibia is mainly livestock based and dependant on natural pastures for grazing. A grazing differs with rainfall the type of livestock production varies accordingly. The southern part of Namibia it is predominantly sheep production and in the higher rainfall central and northern areas it is cattle and goats. Livestock numbers for the different species have stabilized at around 2.4 million cattle, 2.4 million sheep and 1.9 million goats.

The livestock farming sector can be divided into two types of farming sectors; the commercial sector on ± 4 500 title deed farms and approximately 120 000 communal farmers on non-title deed land (state land). Livestock production contributes approximately 90% to the contribution of agriculture to the GDP.

The commercial sector consist of the stud breeders, who are the providers of breeding material and commercial producers who utilize either pure breeds or their crosses for beef and mutton production. Commercial livestock production can be classified as medium-input production systems. Nutritional shortages are bridged through the provision of balanced licks and proper animal health management is provided.

The communal sector is traditionally more subsistence orientated. The annual take off rate is very low, below 6%. This is changing as farmers realize that livestock are of economic importance.

Livestock production in Namibia can geographically, according to rainfall distribution, be divided into small stock production areas in the south and the large stock and mixed livestock production areas in the central and northern areas.

Small stock production, both commercial and communal is based on mutton production. Karakul pelt production is today only a fraction of what it used to be. Prior to the collapse of the pelt industry Namibia produced approximately 4.5 million pelts per annum. Currently approximately 150 000 pelts are sold per annum. Most of the mutton produced is lamb, which is exported as live animals to South Africa. The Government as implemented an export levi on live animals to stimulate value addition within the country. Currently two EU approved export small stock abattoirs are in operation and a further two are under construction.

Beef producers predominantly use pure breeds or their crosses for beef production. In the commercial sector beef production can be divided into two systems; weaner production and ox production. Weaners are sold at auctions and export live to the feedlots in South Africa. Steers and oxen are slaughtered locally at EU approved abattoirs. Namibia currently has an export quota of 13 000 ton to the EU Markets, under the Cotonou Agreement.

In the northern communal areas farmers practice mixed farming; both with different species of livestock and crops and livestock. Predominantly indigenous Sanga cattle are kept.

Namibia is a net importer of pork and poultry products. It supplies in only 50% of the demand. The balance is imported from South Africa.

Namibia is blessed with a rich variety of livestock species and breeds within species, both local/native, locally adapted – introduced over along period of time, and recently introduced.

No breed is currently at risk of extinction in Namibia, for those breeds with limited numbers have sufficient numbers in South Africa, or in their countries of origin. Of concern is the indiscriminative crossbreeding happening in the communal areas, where bulls of exotic breeds, not adapted to the prevailing production environment, are crossed with indigenous Sanga cattle. It is perceived by many of the communal farmers that the Sanga is inferior, due to its small frame size.

DART currently has herds of different Sanga ecotypes at three of its research stations where they are used for research purposes and for *ex situ in vivo* conservation purposes. DART is developing four Livestock Development Centres in the northern communal areas where herds of the local Sanga ecotypes will be kept for the purpose of providing breeding material to the communal farmers and for training of farmers in animal husbandry practices. Two of these LDCs are already operational. DART is involved with the Meat Board of Namibia and a number of breeders associations in a Joint Venture

Programme of livestock improvement in the northern communal areas. Breeding bulls are supplied at subsidized prices to the farmers.

The government as played a role in the Karakul industry since the first importation of Karakul sheep in 1907; in the development of the different colour types, development of the different pelt types; training of farmers and the conservation of the breed after the demise of the industry during the 1980's. This conservation effort continues today.

Indigenous goats are used in a project to evaluate their reproduction and production potential. These herds form part of the ministry's conservation efforts.

With the financial assistance of the SADC/UNDP/FAO Regional Project on the Management of Farm Animal Genetic Resources the genetic characterization of the four ecotypes of Sanga cattle, four ecotypes of indigenous goats and the indigenous pigs were completed.

At Mashare Agricultural Development Institute, DART completed a study on the evaluation of the reproduction and production potential of the indigenous pig. This small herd of pigs is used for supplying local farmers with breeding material.

The perception exists among communal farmers that indigenous livestock are inferior. To rectify this situation, a few issues need addressing; (1) education of farmers on the role of indigenous livestock, livestock management practices to suite the current production environment and marketing of animals and the factors that influence prices and (2) livestock improvement. The completion of the planned LDCs is a priority. At these centers herds of indigenous livestock will be kept and used for the provision of breeding material and the training of farmers.

Namibia still utilizes legislation inherited from South Africa at Independence. A number of these pieces of legislation has been amended, but there is a need for a revision of the legislation currently in use, to either change or amend them to suite Namibia. The need exists for the development of a Livestock Improvement Policy and a Management of Farm Animal Genetic Resources Policy. The Namibian Agricultural Research Plan needs to be revised to reflect the policy of the ministry.

The Animal Recording Schemes in Namibia need to expand to include more of the communal farmers and commercial producers. This will improve the availability of reliable data on livestock production.

The joint venture with the Meat Board of Namibia and a number of breeders associations to supply bulls and rams at subsidized prices to communal farmers should be expanded in order to have a greater impact.

Namibia has one university, one Polytechnic and two agricultural colleagues for tertiary training in agriculture. No school for post graduate studies exists at UNAM. Post graduate qualifications have to be given in cooperation with other universities. There is a

need for the training currently being provided by these institutions to be brought in line with the needs of the industry, especially in the field of animal production, breeding and genetics.

Namibia has very few scientists/ persons with post graduate qualifications in animal genetic resources. To fulfill the needs of the country the number of researcher positions in livestock will have to be increased as well as funds will have to be made available for staff to improve their qualifications.

The awareness of the public on the importance of farm animal genetic resources for food security and the conservation of biodiversity should be raised. It should be done through a long term process which includes the sensitizing of school children, the general public and the education / training of farmers.

Value addition to products and byproducts of the livestock industry should be encouraged at all levels, but especially among communal farmers where it could contribute to income.

6.2 How the Country Report was Prepared

When the process of developing the first State of the World Report on Animal Genetic Resources started during 2001, the FAO called upon countries to indicate their willingness to participate. The Ministry of Agriculture, Water and Rural Development indicated its intention in writing.

Countries were requested to appoint a Consultative Coordinating Committee (CCC), of which the National Coordinator (NC) for FAnGR should be a member, to oversee the process of gathering the necessary information and drafting of the Country Report. This committee was unfortunately never appointed in Namibia. The task of gathering information and drafting the Country Report was the sole responsibility of the National Coordinator.

Letters were sent to institutions and people within the livestock industry, and line ministries, requesting them for relevant documentation). Many role players were interviewed to obtain more detailed / specific information (See Appendix 2 & 3. From the information collected the tables in Appendix 1, which forms the basis for a large part of the Part I of the Country Report was compiled.

After collection of all relevant information the National Coordinator drafted the Country Report. The Report will be circulated to the role players for comments before the final Country Report is submitted to the Honourable Minister: Ministry of Agriculture, Water and Forestry for his signature.

6.3 Annexes:

- **Appendix 1:** Tables in support of the Namibian Country Report on FAnGR
- **Appendix 2:** Persons and institutions consulted in preparing the report
- **Appendix 3:** Documents consulted
- **Appendix 4:** Legislation governing FAnGR

Appendix 1:

Tables in support of the Namibian Country Report on the State of Farm Animal Genetic Resources

Chapter 1: Introducing the Country

Table 1.1: Importance of Livestock to the gross domestic product (GDP) in Agriculture (Millions of US$)

Activity	US$ (millions)	Data from Year
Livestock production	158,774	2002
Other Agric. Production	48,413	2002
Best estimate of additional value of livestock	50,000	2002

Source: Agricultural Statistics Bulletin 2002

Comments:

- Best estimate of additional value includes the value of all perceived contributions of livestock to agricultural services, other than food production, e.g. value of fertilizer from animal production, draught and transportation, forage production etc., which usually are not costed in standard calculations
- Livestock includes domestic ruminants, and birds used for food and agriculture

Table 1.2: Land use and current trends (1000ha)

	Area (1000ha)	Area (1000ha)	Current trend
Category	1990	2000	
Arable land	28 025,112	28 025,112	0
Permanent crops	1 153,975	1 648,536	+
Permanent pastures	57 698,76	57 698,76	-
Agricultural area	70 062,78	70 062,78	-
Land area	81 190,398	81 190,398	0
Total area	82 426,800	82 426,800	0

Comments:

- Arable land: land under temporary crops(double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for “arable land” are not meant to indicate the amount of land that is potentially cultivable.
- Permanent crops: land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee and rubber; this category includes land under flowering shrubs, fruit trees, nut trees and vines, but excludes land under trees grown for wood or timber.
- Permanent pasture: land used permanently (five years or more) for herbaceous forage crops, either cultivated or growing wild (wild prairie or grazing land).
- Land area: total area excluding area under inland water. The definition of inland water generally includes major rivers and lakes.
- Total area: the total area of the country, including area under water.
- Current trend: Indicate current trends in relation to the latest available year (-- strongly decreasing, - decreasing, 0 = stable, + = increasing, ++ = strongly increasing).

Table 1.3: Land use for livestock and current trends

	Area (1000ha)	Area (1000ha)	Current trend
Category	**1990**	**2000**	
Cropping for food	824.268	1 153.876	+
Cropping for feed	5.4	9.7	+
Cropping for food and feed	829.668	1 163.576	+
Natural pasture	57 698.76	57 698.76	0
Improved pasture	1	6	+
Fallow	2 060.671	2 060.671	0
Forest	8 673.013	7 970.197	-
Non-agricultural	12 364.020	12 364.020	0
Total	82 426.800	82 426.800	0

Comments:

- Natural pastures are the ones grown without any external inputs, while improved pastures may be cultivated, semi-cultivated, fertilized, etc.
- Fallow is a non-cultivated cropping land put on rest
- Indicate current trends in relation to the latest available year (-- = strongly decreasing, - = decreasing, 0 = stable, + = increasing, ++ strongly increasing)

Table 1.4: Land tenure for livestock production

Category	Area (1000ha)	%
Private	36 267,792	44
Government and communal	46 159,008	56
Total	82 426,800	100

Comments:

- Private includes the private sector and the long term leasing
- Include all land for which the primary purpose of its use is livestock production

Table 1.5: Farm structure and distribution

Category	Number of farms/ households	%	Number of farms/ households with livestock	%
Communal	150 000 Communal Farmers + 2013 title deed farms in communal areas	18.44	123 000 Communal farmers + 2 013 farmers on title deeds farms	100.00
>0 to 25ha	1 084	9.93	700	64.57
>25 to 50ha	490	4.49	400	81.63
> 50 to 1000ha	822	7.53	790	96.10
>1 000 to 5 000ha	3 483	31.89	3 483	100.00
>5 000 to 10 000ha	2 482	22.73	2 482	100.00
>10 000ha	545	4.99	545	100.0
Unknown	-			
Total	10 919	100.00	10 413	95.37

Table 1.6: Livestock population, number of owners / house-holders and employment by species (2000)

	Livestock Population (1000)	Number of owners/ householders	Number of persons additionally employed	
Species			**Fully**	**Partially**
Cattle	2 504.948	-	-	-
Buffalo	0	0	-	-
Sheep	2 446.146	-	-	-
Goats	1 849.569	-	-	-
Camels	0.078	16	-	-
Lamas & Alpaca	0	0	-	-
Horses	61.885	-	-	-
Donkeys	167.548	-	-	-
Pigs	23.148	-	-	-
Chicken	476.331	-	-	-
Turkey	0	0	-	-
Ducks	0	0	-	-
Geese	0.3	2	-	-
Rabbits	0	0	-	-

Table 1.7: Human population in the country

Year	Total (millions)	Rural /Farming (%)	Urban/Non-farming(%)	Total
1991	1.409 920	1.027 240 (72.958)	382.680 (27.142)	100
2001	1.826 854	1.331 084 (72.862)	495.770 (27.138)	100
Average annual growth rate	2.9			

Comments:

- Rural/Urban and Farming/Non-farming populations will be defined depending on the commonly used terminology for demography.

Table 1.8: Major livestock primary production (1000 tonnes / numbers)

	Meat (n x 1000)		**Milk (million l)**		**Eggs ('000 dozen)**		**Fibre (t)**		**Skins ('000 No)**		**Pelts(No) (1000)**	
Species	**1990**	**2000**	**1990**	**2000**	**1993**	**2000**	**1990**	**2000**	**1993**	**2000**	**1990**	**2000**
Cattle	323,5	259,9	12,57	19,8					178,9	181,3		
Buffalo	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Sheep*	1,030,000	1,223,876	**0**	**0**			38 M 1064 K	**?M** 279,954 K	234,746	234,93	501.	87,146
Goats			**0**	**0**			34.89	**?**				
Camels	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Lamas and alpaca	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Horses	**0**	**0**										
Donkeys	**0**	**0**										
Pigs	8,951	1,464										
Chicken					3,081	3,336						
Turkey	**0**	**0**			**0**	**0**						
Ducks	**0**	**0**			**0**	**0**						
Geese	**0**	**0**			**0**	**0**						
Rabbits	**0**	**0**			**0**	**0**						

Source: Agricultural Statistics Bulletin 2002; Meat Board of Namibia Annual Report 2000

*Figures for sheep and goats are presented together

Table 1.9: Major livestock primary product imports (1000 tonnes / numbers)

	Meat (t)		Milk (t)		Eggs (1000 dozen)		Fibre (t)		Skins (No)		Pelts(No)	
Species	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**
Cattle	**?**	564 mt										
Buffalo	**0**	**0**	**0**	**0**					**0**	**0**		
Sheep		180 mt	**0**	**0**							**0**	**0**
Goats			**0**	**0**								
Camels	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Lamas and alpaca	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Horses	**0**	**0**										
Donkeys	**0**	**0**										
Pigs	21,261 pigs	1,516 pigs + 3,462mt										
Chicken*												
Turkey*					**0**	**0**						
Ducks*					**0**	**0**						
Geese*					**0**	**0**						
Rabbits	**0**	**0**										

*** Not established**

Table 1.10: Major livestock primary product exports (1000 tonnes / numbers)

	Meat (t)		Milk (t)		Eggs (t)		Fibre (t)		Skins (No)		Pelts('000No)	
Species	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**
Cattle	266334 cu	117820 cu										
Buffalo	**0**	**0**	**0**	**0**					**0**	**0**		
Sheep	**?**	536810					38 M 1064 K		**?**	**?**	501	87,146
Goats	**?**	215236	**0**	**0**			**?**	**?**	**?**	**?**		
Camels	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Lamas and alpaca	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**		
Horses	**0**	**0**	**0**	**0**								
Donkeys	**0**	**0**	**0**	**0**								
Pigs	**0**	**0**										
Chicken					**0**	**0**						
Turkey					**0**	**0**						
Ducks					**0**	**0**						
Geese					**0**	**0**						
Rabbits												

Cu = Carcass unit

Chapter 2: The State of Production Systems

Table 2.1: Distribution of livestock by production system (%)

	Production systems			
Species	**Low input**	**Medium input**	**High input**	**Total**
Cattle	66.2	33.7	0.1	100
Buffalo	0	0	0	0
Sheep	14.7	85.3	0	100
Goats	73.4	26.6	0	100
Camels	100	0	0	100
Lamas / Alpaca	0	0	0	0
Horses	85.0	13.4	1.6	100
Donkeys	100	0	0	100
Pigs	64.4	23.6	12.0	100
Chicken	61.8	17.21	20.99	100
Turkey	100	0	0	100
Ducks	100	0	0	100
Geese	0	100	0	100
Rabbits	100	0	0	100

Comments:

- Production Environment: all input-output relationships, over time, at a particular location. The relationships will include biological, climatic, economic, social, cultural and political factors, which combine to determine the production of a particular livestock enterprise.
- Production System: range from areas where there is very little husbandry or human modification of the environment, to very intensive management systems where feed, climate, disease and other factors are controlled or managed by farmers. The level of husbandry or intervention varies enormously from region to region and from farm to farm. Thus, a common way to classify production environments is to group them according to the level of human intervention as:
- **High-input Production System:** a production system where all rate-limiting inputs to animal production can be managed to ensure high levels of animal survival, reproduction and output. Output is constrained primarily by managerial decisions.
- **Medium-input Production System:** a production system where management of the available resources has the scope to overcome the negative effects of the environment, although it is common for one or more factors to limit output, survival or reproduction in a serious fashion.
- **Low-input Production System:** a production system where one or more rate-limiting inputs impose continuous or variable severe pressure on livestock, resulting in low survival, reproductive rate or output. Output and production risks are exposed to major influences, which may go beyond human management capacity

Table 2.2: Changes in the distribution of production systems during the last 20 years

	Production systems			
Species	**Low input**	**Medium input**	**High input**	**Total**
Cattle				
Buffalo				
Sheep				
Goats				
Camels				
Lamas / Alpaca				
Horses				
Donkeys				
Pigs				
Chicken				
Turkey				
Ducks				
Geese				
Rabbits				

Table 2.3: Type of livestock farm by production system for cattle (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	66.7	0	0	66.7
Smallholder	0	0.05	0	0.05
Small-scale commercial	0	0	0	0
Large-scale commercial	0	33.15	0.1	33.25

Comments:

- **Subsistence**: less than 50% of production is marketed
- **Smallholder**: small family farms with more than 50% of production marketed
- **Small-scale commercial:** medium family farms with more than 50% of production marketed
- **Large-scale commercial:** large farms or companies with all production marketed

Table 2.4: Type of livestock farm by production system for buffalo (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0	0	0	0
Smallholder	0	0	0	0
Small-scale commercial	0	0	0	0
Large-scale commercial	0	0	0	0

Table 2.5: Type of livestock farm by production system for sheep (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	14.7	0	0	14.7
Smallholder	0	0.5	0	0.5
Small-scale commercial	0	0	0	0
Large-scale commercial	0	84.8	0	84.8

Table 2.6: Type of livestock farm by production system for goats (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	73.4	0	0	73.4
Smallholder	0	0	0	0
Small-scale commercial	0	0	0	0
Large-scale commercial	0	26.6	0	26.6

Table 2.7: Type of livestock farm by production system for camels (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0	0	0	0
Smallholder	0	0	0	0
Small-scale commercial	100	0	0	100
Large-scale commercial	0	0	0	0

Camels are predominantly used in the tourist and eco-tourism fields.

Table 2.8: Type of livestock farm by production system for lamas and alpaca (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0	0	0	0
Smallholder	0	0	0	0
Small-scale commercial	0	0	0	0
Large-scale commercial	0	0	0	0

Table 2.9: Type of livestock farm by production system for horses (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	34.45	0	0	34.45
Smallholder	0	0	1.0	1.0
Small-scale commercial	0	0	0	0
Large-scale commercial	50.55	13.4	0.6	64.55

Horses are used for work (livestock management) on farms and for recreational purposes

Table 2.10: Type of livestock farm by production system for donkeys (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	91.73	0	0	91.73
Smallholder	0	0	0	0
Small-scale commercial	0	0	0	0
Large-scale commercial	8.27	0	0	8.27

Table 2.11: Type of livestock farm by production system for pigs (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	46.61	0	0	46.61
Smallholder	0	0.4	0	0.4
Small-scale commercial	0	0	0	0
Large-scale commercial	17.79	23.2	12.0	52.99

Table 2.12: Type of livestock farm by production system for chicken (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	49.22	0	0	49.22
Smallholder	0	0.01	0	0.01
Small-scale commercial	0	0	0	0
Large-scale commercial	12.58	17.2	20.99	50.77

Table 2.13: Type of livestock farm by production system for turkey (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0	0	0	0
Smallholder	10.0	0	0	10.0
Small-scale commercial	90.0	0	0	90.0
Large-scale commercial	0	0	0	0

Table 2.14: Type of livestock farm by production system for ducks (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	12.4	0	0	12.4
Smallholder	1.0	0	0	1.0
Small-scale commercial	86.6	0	0	86.6
Large-scale commercial	0	0	0	0

Ducks are mostly kept for own consumption

Table 2.15: Type of livestock farm by production system for geese (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0	0	0	0
Smallholder	0	0	0	0
Small-scale commercial	0	100	0	100
Large-scale commercial	0	0	0	0

Geese are kept for dawn production

Table 2.16: Type of livestock farm by production system for rabbits (%)

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	100	0	0	100
Smallholder	0	0	0	0
Small-scale commercial	0	0	0	0
Large-scale commercial	0	0	0	0

Table 2.17: Type of livestock farm by production system for other species (%)
Name: Ostrich

	Production systems			
Type of operation	**Low input**	**Medium input**	**High input**	**Total**
Subsistence	0.39	13.5	0	13.89
Smallholder	0	0	0	0
Small-scale commercial	0	4.1	29.93	34.27
Large-scale commercial	0	0	52.05	52.05

Chapter 3

The State of Genetic Diversity

Table 3.1: Breed Diversity (Number of Breeds)

	Number of Breeds									
	Current Total		At risk		Widely used		Others		Lost (last 50 yrs)	
Species	**L**	**E**	**L**	**E**	**L**	**E**	**L**	**E**	**L**	**E**
Cattle	4	24	0	0	4	10	0	14	1	0
Buffalo	0	0	0	0	0	0	0	0	0	0
Sheep	2	8	0	0	2	4	0	6	0	0
Goats	4	4	0	0	4	1	0	3	0	0
Camels	0	1	0	0	0	1	0	0	0	0
Lamas/Alpaca	0	0	0	0	0	0	0	0	0	0
Horses	1	14	0	0	0	4	0	10	0	0
Donkeys	1	0	0	0	1	0	0	0	0	0
Pigs	1	3	0	0	1	3	0	0	0	0
Chicken	1	10	0	0	1	6	0	4	0	0
Turkey	0	1	0	0	0	1	0	0	0	0
Ducks	0	3	0	0	0	3	0	0	0	0
Geese	0	2	0	0	0	2	0	0	0	0
Rabbits	0	3	0	0	0	3	0	0	0	0

Comments:

- L = Locally adapted or Native; E = Exotic (Recently Introduced and Continually Imported)
- Breeds at risk are those with total number of breeding females and males less than 1 000 and 20, respectively; or if the population size is less than 1 200 and is decreasing.

Table 3.2: Number of breeds for which characterization has been carried out (Number of breeds)

	At population level				At individual level		
Species	**Baseline survey**	**Genetic distance**	**Breeds and crosses evaluation**	**Valuation**	**Performance recording**	**Genetic evaluation**	**Molecular evaluation**
Cattle	28	28	0	0	23	23	28
Buffalo	0	0	0	0	0	0	0
Sheep	10	10	0	0	0	0	12
Goats	8	5	0	0	0	0	6
Camels	1	1	1	0	0	0	1
Lamas/alpaca	0	0	0	0	0	0	0
Horses	0	15	0	0	(2)	0	(7)
Donkeys	1	0	0	0	0	0	0
Pigs	4	4	3	0	0	0	3
Chicken	11	4	0	0	0	0	4
Turkey	0	0	0	0	0	0	0
Ducks	0	0	0	0	0	0	0
Geese	0	0	0	0	0	0	0
Rabbits	0	0	0	0	0	0	0

Comments:

- Consider breed characterization during the last ten years.
- Baseline survey summary data describing the identification and observable characteristics, location, uses and general husbandry of the AnGR for each species used in the country for food and agricultural production.
- Genetic distances among breeds computed from molecular analysis.
- “Breeds and crosses evaluation” refers to estimation of direct and maternal additive genetic, and heterosis effects.
- Valuation = description of the extent to which market values of AnGR predict their “real” or “fair” value, accounting for all goods and services they may provide to current and future generations of humankind. In the case of market failures, market prices will differ from the value that society attaches to AnGR.
- Performance recording is based on individual animal data for milk yield, growth, reproduction, etc.
- Genetic evaluation refers to estimation of breeding values.
- Molecular evaluation includes information of markers, DNA, blood type, protein alleles, etc.

Most of the characterization work was done outside Namibia, but the results are applicable to the animals of the breeds found in Namibia.

Chapter 4

The State of Utilization of AnGR (Use and Development)

Table 4.1: Relative importance of livestock products and services within species (%)

Species	MEAT	MILK	EGGS	FIBRE	SKIN	Risk Management	Fertiliser manure	DRAUGHT	CULTURE	RECREATION	FUEL	FEATHER	Environmental management	TOTAL
Cattle	50	20				10	5	5	10					100
Buffalo														
Sheep	90			1	9									100
Goats	75	5			3	16	1							
Camels										100				100
Lamas &Alpakas														
Horses								10		90				
Donkeys	10							90						100
Pigs	100													100
Chicken	90		10											100
Turkey	100													100
Ducks	100													100
Geese	20											80		100
Rabbits	100													100

Comments:

- Food and agricultural outputs are products that have a relative contribution to national production. Sum of each species = 100.

Table 4.2: Relative importance of species within livestock products and services (%)

Species	Meat	Milk	Eggs	Fibre	Skin	RiskMnangement	Fertiliser manure	Draught	Culture	Recreation	Fuel	Feather	Environmental management
Cattle													
Buffalo													
Sheep													
Goats													
Camels													
Lamas/Alpaca													
Horses													
Donkeys													
Pigs													
Chicken													
Turkey													
Ducks													
Geese													
Rabbits													
Total													

Table 4.3: Number of widely used breeds with breeding strategies (No. of breeds)

		Breeding strategies		
Species	**Total number of breeds**	**Purebred selection**	**Crossbreeding**	**Both**
Cattle	24	24		
Buffalo	0	0	0	0
Sheep	12	12		
Goats	8	4		
Camels	1	1	0	0
Lamas / Alpaca	0	0	0	0
Horses	15	14		
Donkeys	1	0		
Pigs	4	3	3	
Chicken	11	10		
Turkey	1	1		
Ducks	3	3		
Geese	2	2		
Rabbits	3	3		

Table 4.4: Number of breeds with current breeding strategies and tools being used (No of Breeds)

		Breeding Strategies		Tools				
Species	**Breeding goals**	**Designed**	**Designed and implemented**	**Individual ID**	**Record-ing**	**AI**	**ET**	**Genetic evaluation**
Cattle	**24**	**24**	**24**	**24**	**24**	**23**	**3**	**23**
Buffalo	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Sheep	**10**	**10**	**?**	**10**	**?**	**10**	**0**	**4**
Goats	**3**	**3**	**3**	**3**	**?**	**1**	**1**	**0**
Camels	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**
Lamas /Alpaca	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Horses	**14**	**14**	**14**	**14**	**2**	**?**	**0**	**0**
Donkeys	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Pigs	**3**	**3**	**3**	**3**	**3**	**3**	**0**	**0**
Chicken	**?**	**?**	**?**	**?**	**?**	**?**	**0**	**?**
Turkey	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ducks	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Geese	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Rabbits	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Comments:

- AI = Artificial Insemination; ET = Embryo Transfer

Table 4.5: State of the art of technologies / methodologies used in breeding strategies

	Used for:	
Technology of Methodology	**Research**	**Breeders**
Multi-trait selection index construction	No	No
Optimization tools for breeding plans	No	No
Electronic database related to recording schemes	Yes (100%)	Yes (20%)
Genetic evaluation Software for: phenotypic selection breeding values	Yes (30%)	Yes (50%)
Reproductive technologies (AI; ET, etc.)	Yes (10%)	Yes (10%)
Micro-satellite linkage maps for QTL identification for Marker Assisted Selection	No	No
Other technology (specify)		

Comments:

- percentage indicate the extent that the technology or methodology is being used at research institutions or by breeders' associations in the country.

Table 4.6: Role of stakeholders in the implementation of tools for the development of AnGR.

Stakeholdes	**Breeding goals**	**Individual identification**	**Recording**	**Artificial insemination**	**Genetic evaluation**
Federal Government	NA	NA	NA	NA	NA
State government	1	5	5	1	1
Local Government	NA	NA	NA	NA	NA
Breeders	5	5	4	3	4
Private companies	2	2	2	1	1
Research	3	4	5	3	2
NGO's	1	1	1	1	1

Comments:

- Scores (1 = none; 2 = little; 3 = regular; 4 = more; 5 = high) based on the role of involvement of each stakeholder on the implementation of tools that support the development of AnGR.

Table 4.7: Involvement of stakeholders in activities related to the development of AnGR

Stakeholder	Legislation	Breeding	Infrastructure	Human	Farmers
Federal Government	NA	NA	NA	NA	NA
State Government	**5**	**5**	**5**	**3**	**4**
Local Government	**NA**	**NA**	**NA**	**NA**	**NA**
Breeder's associations	**5**	**5**	**3**	**3**	**4**
Private companies	**2**	**2**	**2**	**2**	**2**
Research	**5**	**5**	**5**	**5**	**5**
NGO's	**1**	**1**	**1**	**1**	**1**

Table 4.8: Stakeholders preference for animal genetic resources

Stakeholders	Locally adapted breeds	Imported within region	Imported exotic breeds
Federal Government	**NA**	**NA**	**NA**
State Government	**5**	**4**	**2**
Local Government	**NA**	**NA**	**NA**
Breeder's associations	**2**	**4**	**3**
Private companies	**2**	**4**	**3**
Research	**5**	**3**	**2**
NGO's	**1**	**4**	**4**

Table 4.9: Priority of needs for utilization of technologies for the development of AnGR

Technology	Needs			
	Knowledge	Training	Financial resources	Breeder's organization
Recording	5	5	2	4
Genetic evaluation	5	3	2	3
AI / ET	5	2	1	2
Molecular techniques	5	2	2	2
Breed organisation techniques	3	1	1	1

Comments:

- AI – Artificial Insemination; ET = Embryo Transfer
- Scores indicate the priority of solving specific needs in order to use technologies to support the development of AnGR. (1= none; 2= little; 3= regular; 4= more; 5= high)

Chapter 5

The State of Conservation of AnGR

Table 5.1: Current number of breeds in managed conservation programmes

	Number of locally adapted breeds at risk			
Species	**Total**	**Managed *in situ***	**Managed *ex situ***	**Both (*in* and *ex situ*)**
Cattle	4	3	3	3
Buffalo	0	0	0	0
Sheep	2	1	1	1
Goats	4	0	4	0
Camels	1	0	1	0
Lamas / Alpaca	0	0	0	0
Horses	0	0	0	0
Donkeys	0	0	0	0
Pigs	1	1	0	0
Chicken	1	1	1	1
Turkey	0	0	0	0
Ducks	0	0	0	0
Geese	0	0	0	0
Rabbits	0	0	0	0

Comments:

- *In situ* conservation: includes all measures to maintain live animal breeding populations, including those involved in active breeding strategies in the agro-ecosystem where they either developed or are now normally found, together with husbandry activities that are undertaken to ensure the continued contribution of these resources to sustainable food and agricultural production, now and in the future.
- *Ex situ* conservation: genetic material within living animals but out of the environment in which it developed (*Ex situ in vivo)*, or external to the living animal in an artificial environment, usually under cryogenic conditions including, *inter alia*, the cryoconservation of semen, oocytes, embryos, cells or tissues (*Ex situ in vitro)*. Note that *ex situ* conservation and *ex situ* preservation are considered here to be synonymous.

Table 5.2: Current number of breeds receiving incentives and for which various tools for management of *ex situ* conservation programmes are used

	Incentives			Tools				
Species	**Govt**	**NGO**	**Market**	**Semen storage**	**Embryos storage**	**DNA/ Tissue storage**	***In vivo***	**Monitoring system**
Cattle	4	0	0	0	0	0	0	0
Buffalo	0	0	0	0	0	0	0	0
Sheep	2	0	0	0	0	0	0	1
Goats	4	0	0	0	0	0	0	0
Camels	0	0	0	0	0	0	0	0
Lamas / Alpaca	0	0	0	0	0	0	0	0
Horses	0	0	0	0	0	0	0	0
Donkeys	0	0	0	0	0	0	0	0
Pigs	1	0	0	0	0	0	0	0
Chicken	1	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0
Ducks	0	0	0	0	0	0	0	0
Geese	0	0	0	0	0	0	0	0
Rabbits	0	0	0	0	0	0	0	0

Comments:

- In vivo, such as zoological garden, farm park, etc.
- Incentives means any kind of support (human and financial resources, tax waving, higher prices, etc.) that stimulates conservation programmes of AnGR.
- Monitoring system refers to the number of schemes in which more than 10% of population size is conserved

Table 5.3: Current number of breeds receiving incentives and for which various tools for management of *ex situ* conservation programmes are used

	Incentives				Technical tools			
Species	**Gov.**	**NGO**	**Market**	**Private**	**Recording**	**AI**	**ET**	**Others**
Cattle	5	0	0	3	3	0	0	0
Buffalo	0	0	0	0	0	0	0	0
Sheep	2	0	0	2	1	2	0	0
Goats	4	0	0	0	0	0	0	0
Camels	0	0	0	0	0	0	0	0
Lamas / Alpaca	0	0	0	0	0	0	0	0
Horses	0	0	0	0	0	0	0	0
Donkeys	0	0	0	0	0	0	0	0
Pigs	1	0	0	0	0	0	0	0
Chicken	1	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0
Ducks	0	0	0	0	0	0	0	0
Geese	0	0	0	0	0	0	0	0
Rabbits	0	0	0	0	0	0	0	0

Comments:

- AI = Artificial insemination; ET = Embryo Transfer
- Incentives means any kind of support (human and financial resources, tax waving, higher prices, etc.) that stimulates conservation programmes of AnGR.

Table 5.4: Stakeholders involvement in the management of conservation programmes

Stakeholders	***In situ* Conservation**	***Ex situ* Conservation**
Government	5	5
Breeder's associations	2	3
Private companies	0	3
Research institutions/ universities	5	5
NGO's	0	0

Comments:

- Scores indicate the degree of involvement of each stakeholder on conservation programmes (1 = none; 2 = little; 3 = regular; 4 = more; 5 = high).

Table 5.5: Priority of needs for utilization of technologies for *in situ* conservation programmes

Technology	**Needs**			
	Knowledge	**Training**	**Financial resources**	**Technology**
Recording	3	3	4	3
Genetic evaluation	5	5	5	5
AI / ET	3	3	2	2
Molecular techniques	5	5	5	5
Breeders improvement techniques	4	4	2	3

Comments:

- AI = Artificial Insemination; ET = Embryo Transfer
- Scores indicate the priority of solving specific needs in order to use technologies to support conservation programmes (1 = none; 2 = little; 3 = regular; 4 = more; 5 = high).

Chapter 6

The State of Policy Development and Institutional Arrangements for AnGR

Table 6.1: Effects of existing policies and legal instruments on the utilization (use and development) of AnGR.

	Urban/peri-urban systems		Rural production	
Species	**Industrial systems**	**Small-holder systems**	**Industrial systems**	**Small-holder systems**
Cattle	3	3	3	3
Buffalo	1	1	1	1
Sheep	3	3	3	3
Goats	3	3	3	3
Camels	2	2	2	2
Lamas / Alpaca	1	1	1	1
Horses	2	2	2	2
Donkeys	1	1	1	1
Pigs	2	2	2	2
Chicken	2	2	2	2
Turkey	1	1	1	1
Ducks	1	1	1	1
Geese	1	1	1	1
Rabbits	1	1	1	1

Comments:

- Scores (1 = none; 2 = little; 3 = regular; 4 = more; 5 = high) indicate the extent that existing policies and legal instruments support the use and development of AnGR.

Table 6.2: The focus of current policies on activities related to the utilization (use and development) of AnGR.

	Activities			
Species	**Use of exotic breeds**	**Use of locally adapted breeds**	**Training, research and extension**	**Organization of breeders/farmers**
Cattle	3	5	5	2
Buffalo	1	1	1	1
Sheep	2	4	3	2
Goats	2	4	3	2
Camels	2	2	2	2
Lamas / Alpaca	1	1	1	1
Horses	2	2	2	2
Donkeys	1	1	1	1
Pigs	2	3	3	2
Chicken	2	2	2	2
Turkey	1	1	1	1
Ducks	1	1	1	1
Geese	1	1	1	1

Comments:

- Scores(1 =none; 2 = little; 3 = regular; 4 = more; 5 = high) indicate the extent that current policies support activities related to utilization of AnGR.

Table 6.3: Prioritizing the needs to enable the development of AnGR policies

	Required		
Needs	Immediately	Medium term	Long term
National Policy for the Management of Farm Animal Genetic Resources	*		

Table 6.4: The priority of future needs in policy development for AnGR conservation programmes.

	Policy development related to				
Species	**Technology**	**Infrastructure**	**Human resources**	**Financial resources**	**Organizational structures**
Cattle			4	4	
Buffalo	1	1	1	1	1
Sheep			4	4	
Goats			4	4	
Camels	1	1	1	1	1
Lamas / Alpaca	1	1	1	1	1
Horses	2	2	2	2	
Donkeys	1	1	1	1	1
Pigs			4	4	
Chicken			4	4	
Turkey	1	1	1	1	1
Ducks	1	1	1	1	1
Geese	1	1	1	1	1
Rabbits	1	1	1	1	1

Comments:1

- Scores (1 = none;2 = little; 3 = regular; 4 = more; 5 = high) indicate the priority for the development of policies to support AnGR conservation programmes.

Table 6.5: The priority of future needs in policy development for the utilization (use and development) of AnGR.

	Policy development related to				
Species	**Technology**	**Infrastructure**	**Human Resources**	**Financial resources**	**Organizational structures**
Cattle					
Buffalo					
Sheep					
Goats					
Camels					
Lamas / Alpaca					
Horses					
Donkeys					
Pigs					
Chicken					
Turkey					
Ducks					
Geese					
Rabbits					

Scores (1 = none;2 = little; 3 = regular; 4 = more; 5 = high) indicate the priority for the development of policies to support AnGR conservation programmes.

Appendix 2:

Persons and Institutions consulted and who provided inputs for the drafting of this Country Report.

Person	Position	Institution
Mr. P.T. Jessen		Ministry of Agriculture, Water and Rural Development
Mr. A. Faul	Directorate of Planning	Ministry of Agriculture, Water and Rural Development
Ms. G. Pickering	Chief Statistician: Directorate of Planning	Ministry of Agriculture, Water and Rural Development
Mr. P.J Strydom	General Manager	Meat Board of Namibia
Dr. R. Paskin	Operations Manager	Meat Board of Namibia
Mr. H. Grobler	Manager: Northern Communal Areas	Meatco
Mr. A. Mouton	Marketing Manager	Meatco
Mrs. M. Coetzee	Chief Research Officer: Agricultural Laboratory	Ministry of Agriculture, Water and Rural Development
Mr. J.N. de Klerk	Consultant (Ex Director: Director of Agricultural Research and Training)	NAPCOD Programme
Mr. Y. Mesfin	National Coordinator: Telefood Programme. Directorate of Planning	Ministry of Agriculture, Water and Rural Development.
Mr. W. Visser		Agra: Karakul Pelt Centre
Mr. P.H. Hugo		Agra: Manager: Livestock
Prof. O. Mandamele	Dean: Faculty of Agriculture and Natural Resources	University of Namibia (UNAM)
Ms. M. de Beer	Namibia Qualifications Authority (NQA)	Ministry of Higher Education, Training and Employment Creation
Mr. Tjimune	General Manager	NNFU
Mr. S. Coetzee	General Manager	NAU
Dr.A. Norval	Deputy Director: Veterinary Services	MAWRD
Mr. Wallie Roux	PRO	Meatco

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