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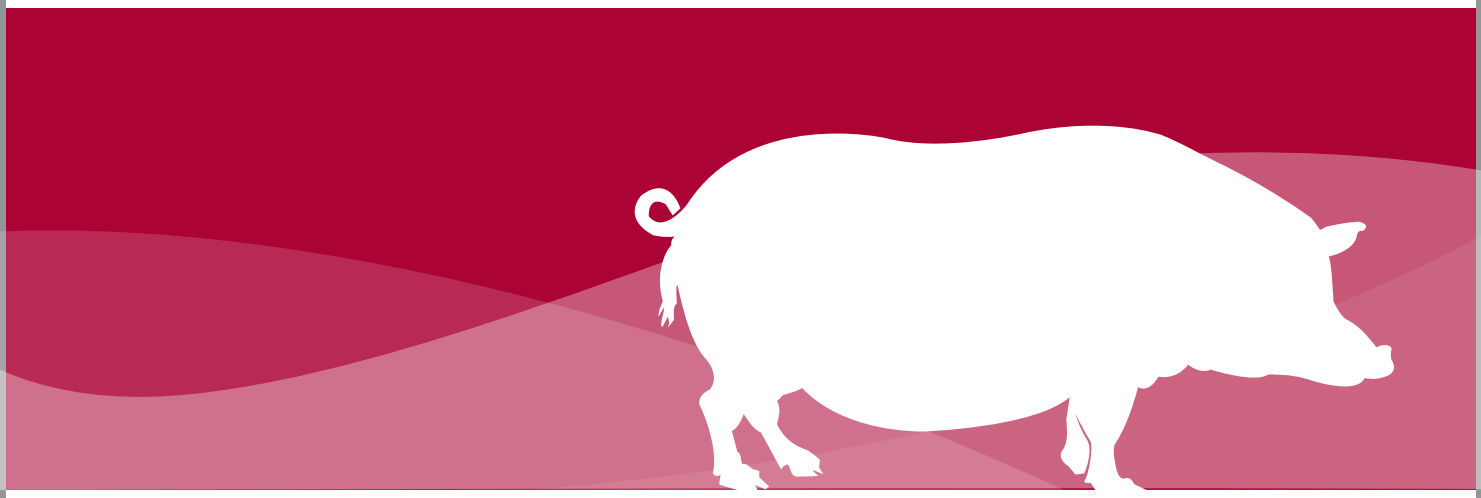
FAO ANIMAL PRODUCTION AND HEALTH



livestock country reviews

PIG SECTOR

Kenya

3

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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Foreword

Pig production is, along with poultry production, the fastest growing livestock sector worldwide and this trend is expected to continue over the coming years. Growth in the sector is mostly happening in developing and in-transition countries while animal numbers in developed countries are stable or declining slightly. Pig production is gaining importance in societies that are currently undergoing a shift from ruminant to monogastric livestock production. Increasing demand, a shorter life cycle with higher return rates and advantageous feed efficiency are key reasons for this development.

The role pig-keeping might play for the farmer, especially when referring to small-scale and backyard farming systems, goes far beyond pork production and income generation. Pigs are, from an economic perspective, an asset representing a store of wealth or safety net for times of crisis; while, from a sociological perspective, traditional ceremonies and beliefs in some places centre on the pig as an asset crucial to their belief system. With regard to gender, pigs are the key income generator for women, or marginalized groups within society, in some cultures.

The expanding pig production sector is facing diverse challenges. Sustainable sector growth implies an accompanying growth in infrastructure which, in many countries, is not happening at the same pace. This discrepancy, combined with the sector's growing importance in the livelihoods of more and more people, makes it a vulnerable component of the economic and social backbone of a number of countries. Insecure feed availability, insufficient sanitation and poor pig husbandry, as well as a lack of sound veterinary services and meat inspection are factors that lead to poor animal, public, and environmental health.

In order to develop appropriate strategies for sector development, including disease control measures, a better understanding is required of the different pig sectors, their associated market chains, and the position of pigs within society.

This review for Kenya have been developed in collaboration with FAO ECTAD, Eastern Africa and is part of a series of Country Reviews commissioned by the Animal Production and Health Division (AGA). It is intended as a resource document for those seeking information about the pig sector at a national level, and is not exhaustive. Some topics are only partially covered or not covered at all and this document is subject to ongoing updating. The author(s) and FAO/AGA welcome your contributions and feedback.

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Acronyms and abbreviations

ADC	Agricultural Development Corporation
ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ASDS	Agricultural Sector Development Strategy
ASF	African Swine Fever
BUDIPIFA CBO	Busia District Pig Farmers Community Based Organization
BVQI	Bureau Veritas Quality International
CDC	Centre for Disease Control of the United States of America
CDW	Cold Dressed Weight
COMESA	Common Market for Eastern and Southern Africa
DLPO	District Livestock Production Officer
DVO	District Veterinary Officer
DVS	Director of Veterinary Services
EAC	East Africa Training and Extract Company
EATEC	East African Community
ECTAD	Emergency Centre for Transboundary Animal Disease
ELISA	Enzyme-linked immunosorbent assay
FAO	Food and Agriculture Organization of the United Nations
FC	Farmer's Choice Limited
GCC	Gulf Cooperation Countries
GNI	Gross National Income
HACCP	Hazard Analysis Critical Control Point
IDEAL	Infectious Diseases of East African Livestock
ILRI	International Livestock Research Institute
IPS	Aga Khan Foundation Investment Promotion Service
KARI	Kenya Agricultural Research Institute
KEMRI	Kenya Medical Research Institute
KENPFA	Kenya National Pig Farmers Association
KNBS	Kenya National Bureau of Statistics
KNFAP	Kenya National Association of Agricultural Producers
KSPCA	Kenyan Society for the Prevention of Cruelty to Animals
MOLD	Ministry of Livestock Development
MDGS	Millennium Development Goals
NAHRS	National Animal Husbandry Research Station
NCC	Neurocysticercosis
PDVS	Provincial Director of Veterinary Services
PCR	Polymerase Chain Reaction
SPS	Sanitary and Phytosanitary Standards
UAE	United Arab Emirates

Chapter 1

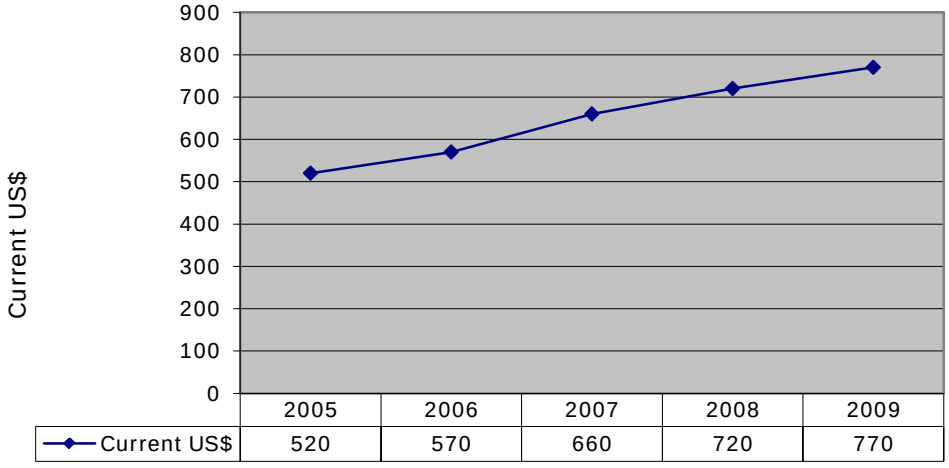
The country in brief

Country:	Kenya		
Location:	East Africa, bordering Indian Ocean, between Somalia and Tanzania		
Population, total	38.61 million	*Source:*	Kenya National Bureau of Statistics, August 2010
Population, growth rate:	2.6 % (2009)	*Source:*	World Bank, World Dev't Indicators, February 2011
Economy group:	Low income	*Source:*	World Bank, November 2010

Kenya's economy depends on agriculture, and includes a fast-growing livestock sector. The country borders Tanzania, Uganda, Somalia, the Indian Ocean, Sudan and Ethiopia. It is a member of the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA). Agriculture is the mainstay of the economy and the bulk of its industries and exports are agriculture-based. According to the 2009 population census, over 20 million of the population, which numbers 38.6 million in total, are between the ages of 15 and 64, and the male to female ratio is more or less even. The country is divided into 47 administrative counties (since August 2010) - each of which aims to be autonomous, with central government retaining monitoring and oversight functions. In terms of the livestock sector, all activities take place at the county level, with only the registration of veterinary surgeons carried out by central government.

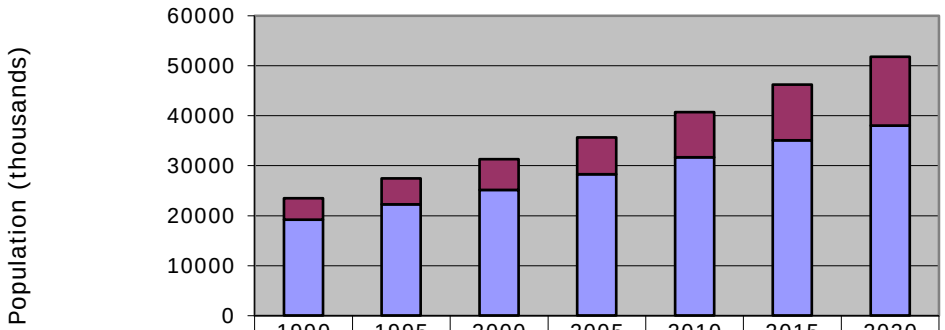
The Gross National Income (GNI) per capita has increased between 2005 and 2009, as shown below in Figure 1. This may reflect improved living standards for the population.

FIGURE 1: **Gross national income (GNI) per capita (Atlas method, current US$)**



Source: World Bank Group World Development Indicators, November 2010

FIGURE 2: **Demographic profile**

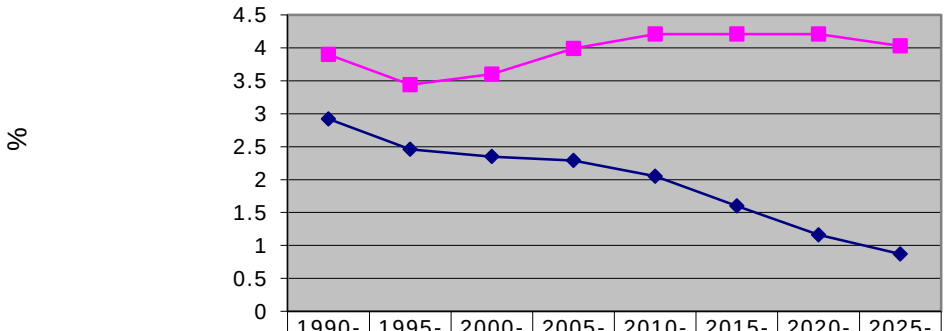


	1990	1995	2000	2005	2010	2015	2020
Urban population	4273	5193	6187	7384	9015	11126	13735
Rural population	19174	22187	25085	28215	31630	35041	37956

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: World Urbanization Prospects 2007.

The urban population is projected to increase steadily from fewer than 5 million in 1990 to over 20 million in the year 2030, while the rural population is projected to stabilize at about 40 million from the year 2020. This urban growth is significant but the majority of the Kenyan population will continue to live in rural areas.

FIGURE 3: **Annual population growth rates**



	1990-1995	1995-2000	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030
Rural annual growth rate	2.92	2.46	2.35	2.29	2.05	1.6	1.16	0.87
Urban annual growth rate	3.9	3.44	3.6	3.99	4.21	4.21	4.21	4.03

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: World Urbanization Prospects 2007

The annual urban population growth rate is projected to stabilize at around 4 percent between 2010 and 2025/30. Rural population growth is projected to drop from around two percent to a low of 0.87 percent over the same period. Contributing factors underlying this prediction include rural-urban migration, climate change, government policies and illicit brews[1] in some of the densely populated rural areas.

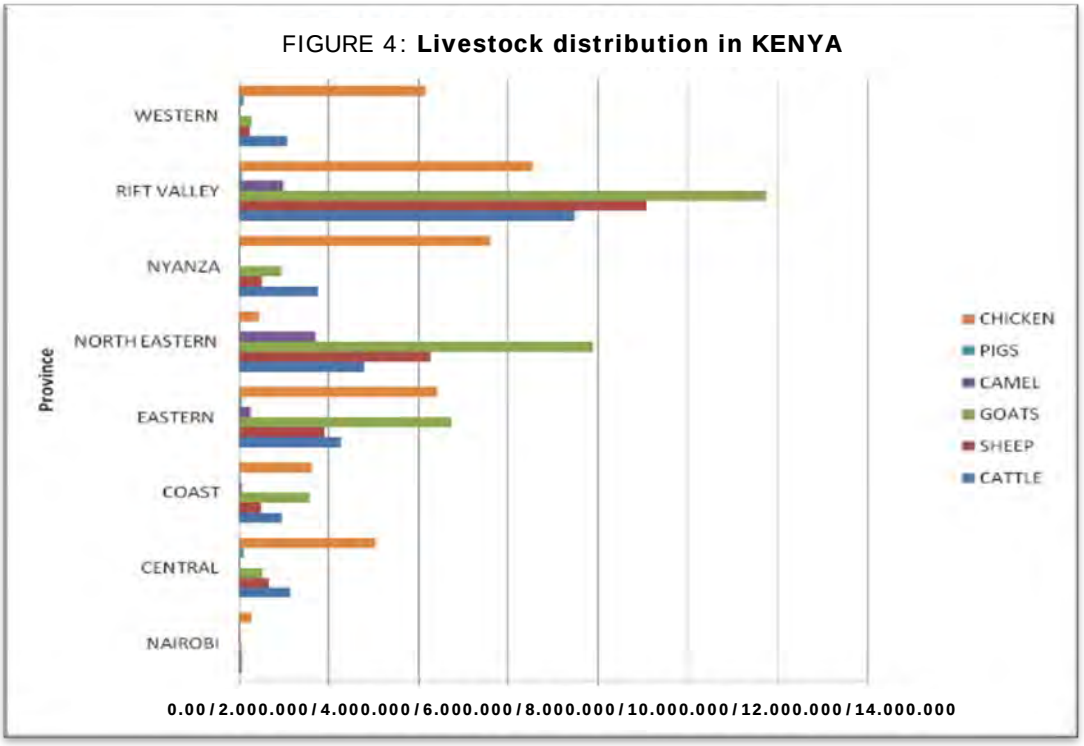
[1] *Illicit brews* refer to traditional strong liquors which impact on work attendance and performance (mostly among young males), and also affect their fertility.

Chapter 2

Profile of the pig sector

2.1 LIVESTOCK DISTRIBUTION IN KENYA

FIGURE 4: **Livestock distribution in KENYA**



Source: KNBS 2009 census

2.2 GEOGRAPHICAL DISTRIBUTION OF THE PIG POPULATION

As can be seen from the figures in 2.1 (Figure 4) and 2.2 (Tables 1) above, Western, Rift Valley, Nyanza, Eastern, Central and Nairobi Provinces are the six regions with somewhat significant pig populations. The numbers of pigs in the remaining two regions of North Eastern and Coast, although low now, were previously non-existent, indicating a potential new trend. The expansion and improvement of the market for pigs and pig products generally in Kenya may explain why pig-keeping is beginning to be found outside traditional pig-keeping areas.

Traditional/backyard systems are the main systems in Western and Nyanza Provinces while commercial systems are predominant in Eastern and Central Provinces. In Nairobi, the traditional/backyard systems dominate in the slums while commercial systems owned by Farmer's Choice and by a few commercial farmers who supply pigs to Farmer's Choice are found in the outskirts of the city. The pig holdings in Coast and the few in North Eastern are commercial systems.

TABLE 1:

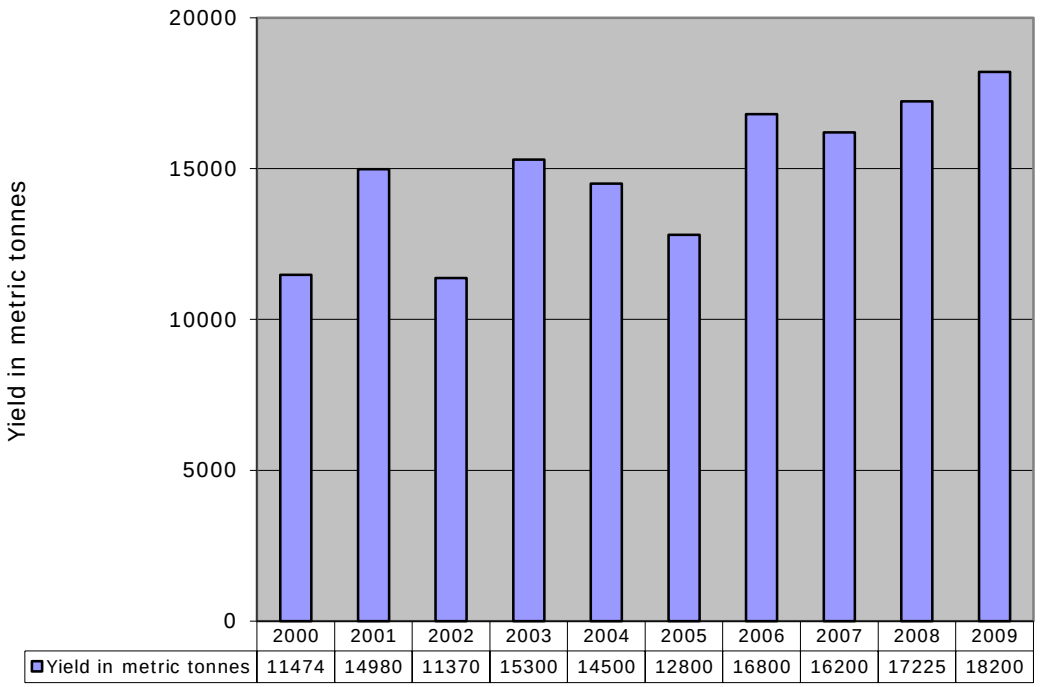
Distribution of pig holdings within the country[2]

Province	Pig population	Commercial sector	Traditional/Backyard sector
Western	87 838	3 512	84 325
Rift Valley	48 495	14 579	35 654
Nyanza	27 612	900	26 712
North Eastern	68	68	0
Eastern	43 480	35 654	7 826
Coast	5 243	5 243	0
Central	91 977	75 421	16 556
Nairobi	29 976	13 976	16 000
Total Kenya	335 301	149 965	**187 073**

Source: KNBS 2009 Census; MOLD Department of Livestock Production Estimates, 2010

2.3 PRODUCTION

FIGURE 5: **National pig sector production**

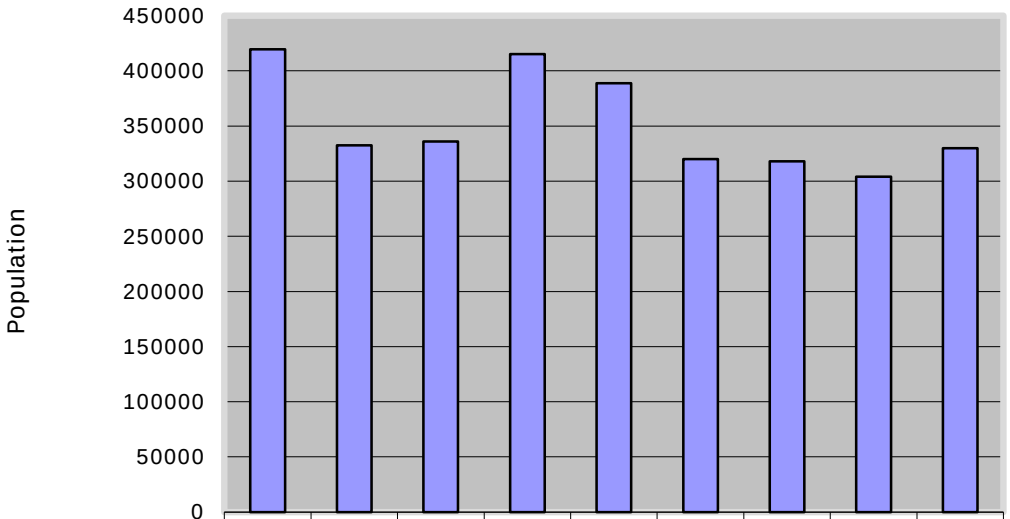


Source: FAOSTAT , 2010

[2] Data on the production system (breeding, fattening, etc.) is not available

Production has not changed greatly over the period. There is a difference of about 700 tonnes between the lowest production figures in 2000 and the highest in 2009.

FIGURE 5.1: **National pig population estimates**

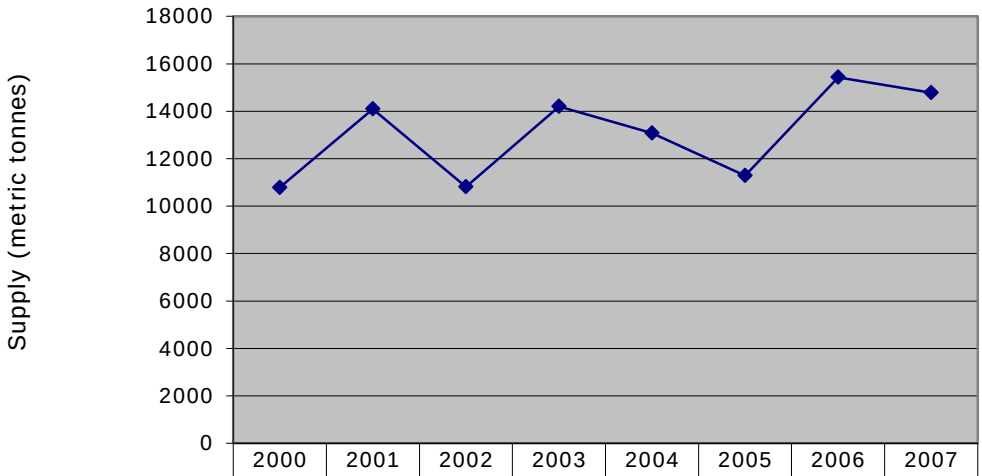


	2000	2001	2002	2003	2004	2005	2006	2007	2008
Pig population	419584	332600	335900	415200	388760	320000	318000	304000	330000

Source: MOLD-LPD,2009

2.4 CONSUMPTION

FIGURE 5.2**: Estimated pork supply in Kenya**



	2000	2001	2002	2003	2004	2005	2006	2007
Supply in tonnes	10780.3	14096.5	10813.3	14202.5	13076.5	11287	15431.8	14779.5

Source: MOLD-LPD, 2009

TABLE 2:

Performance of the pig sector from 2000 to 2005

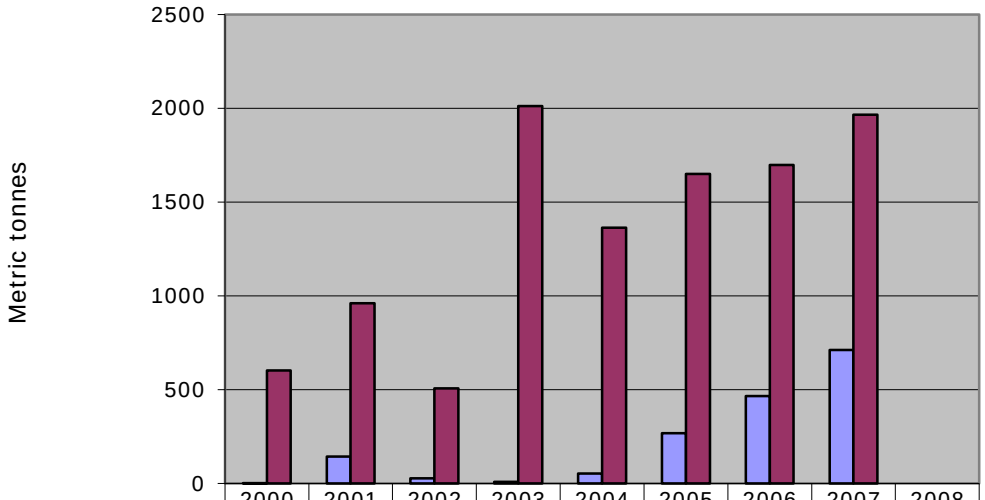
Year	Population	No. Slaughtered	Meat (MT)	Value[3]
2000	315 208	163 908	11 473.56	1.15 Ksh Billions
2001	332 600	172 952	12 106.64	0.85 Ksh Billions
2002	335 900	174 668	12 226.76	0.86 Ksh Billions
2003	415 200	215 904	15 113.28	1.06 Ksh Billions
2004	388 760	188 660	13 206.20	0.92 Ksh Billions
2005	320 000	153 600	10 752.00	0.86 Ksh Billions

Source: MOLD – LPD, 2006

The pig population was almost stagnant between 2000 and 2005, although in 2003 there was a short-lived recovery in population and numbers slaughtered, reflecting market fluctuations. The pig market is dependent on tourism, so factors that affect the performance of the tourist industry also affect the market for pork and pork products. Over 80 percent of the slaughter was carried out by Farmer's Choice which is the main supplier of pork and pork products to the domestic and export market.

2.5 TRADE

FIGURE 7.1**: Import and export of pork**



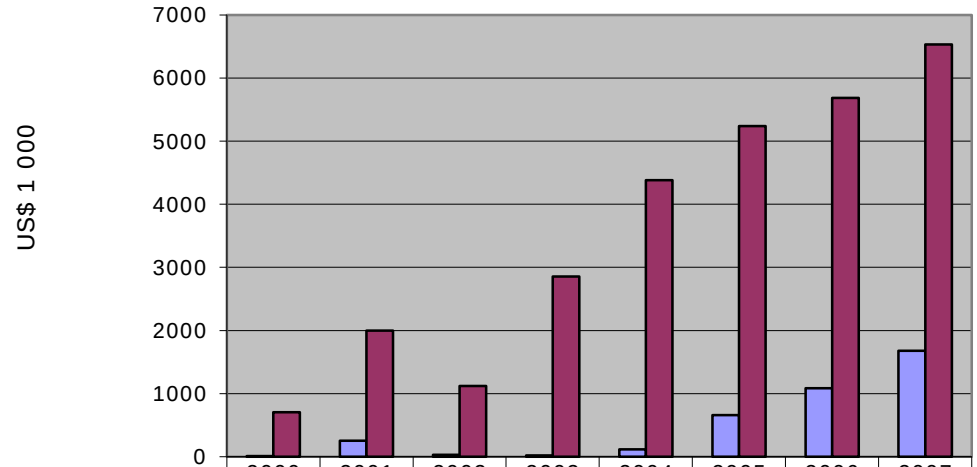
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Imports (metric tonnes)	2	144	27	8	53	268	465	711	
Exports (metric tonnes)	603	960	507	2012	1364	1649	1698	1966	

Source: FAOSTAT, 2010

[3] Exchange rate ranged between 75 Kshs to 84.5 Kshs = 1US$ over the period

Imports have increased from 2005 onwards. Most of the imports were from Brazil and Canada (MOLD 2009). Exports, most of which were to COMESA countries, were sustained at over 1 300 tonnes per year from 2003.

FIGURE 7.2**: Import and export values of pork**



	2000	2001	2002	2003	2004	2005	2006	2007
Imports (US$ 1 000)	6	251	28	19	116	660	1082	1679
Exports (US$ 1 000)	705	1996	1122	2856	4381	5241	5687	6533

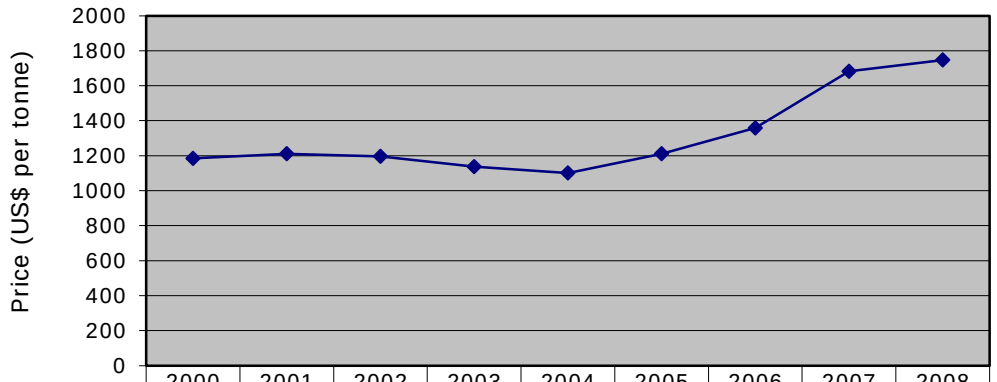
Source: FAOSTAT, 2010

Export values show a steady increase from 2003 onwards. Farmer's Choice is the main exporter of pork and pork products, to both COMESA and non-COMESA countries.

Farmer's Choice is also Kenya's main importer of pork. Prices here also show a steady increase from 2005. The imported meat is processed into value-added pork products.

2.6 PRICES

FIGURE 8: **Wholesale prices for Kenyan pork**



	2000	2001	2002	2003	2004	2005	2006	2007	2008
US$ / tonne	1184	1211	1196	1137	1101	1211	1358	1682	1747

Source: FAOSTAT, 2010

Wholesale prices for pork produced in Kenya ranged from a low of US$ 1 101.3 per tonne in 2004 to a high of US$ 1 747.1 per tonne in 2008, reflecting fluctuating demand for pork and pork products. In Kenya, demand for pork is currently driven by tourism, in the main. This may change as the popularity of pork continues to increase in the urban areas of Kenya.

Chapter 3

Pig production systems

3.1 BACKGROUND INFORMATION

3.1.1 History

Pig production in Kenya dates back to the beginning of the twentieth century. The production of surplus cereals and skimmed milk provided the basis for pig-keeping as a subsidiary activity for British settlers who operated large-scale commercial farms during the colonial period from 1900 to 1963. After independence, small-scale farmers with between two and twenty sows entered the market alongside large-scale producers.

TABLE 3:

Brief background of pig production in Kenya

1904	European settlers brought in pigs from the Seychelles
1905	Colonial government imported Berkshire and large black pig breeds from Britain
1905	Proposal to build slaughter house (abattoir) at Njoro
1905	Abattoir built at Uplands, Limuru
1905	Outbreak of African Swine Fever (Tuitoek & Kosgey 1999)
1940s	Pig Producers Association and Pig Industry Board formed to control prices and provide market facilities
1953	Pig breeding station opened in Naivasha by white settlers
1959	Pig Producers Association dissolved and Uplands Bacon Factory became parastatal organization
1972	Uplands Bacon Factory began large-scale production and marketing of pig products
1984-95	Uplands collapsed and Farmer's Choice expanded
Late 1980s, 1990s	Agricultural Development Corporation (ADC) farms ceased pig farming operations
1990s	East Africa Training and Extract Company (EATEC) stepped up pig production at Eldoret
2008	Suspension of pig breeding at National Animal Husbandry Research Station (NAHRS), Naivasha

3.1.2 Present-day

The livestock subsector contributes about ten percent to Gross Domestic Product (GDP) and accounts for over 30 percent of the farm gate value of agricultural commodities.

The Kenyan government has continued to encourage pig production as it plays a major role in the tourism sector. Up to 70 percent of all pig farmers are engaged in small-scale production. Feeds and feeding constitute about 80 percent of the total production cost, which is why many producers are looking for cheaper ways to feed their animals.

A variety of production systems currently operate in Kenya's pig sector. There are large intensive commercial pig farms, small-scale commercial farms and free range traditional systems (including scavenging and roaming) in Western Kenya, Nyanza and the suburban slum areas of the major cities and towns.

The free range system is characterized by high mortality rates, low offtake, low reproductive rates, minimal health care or supplementary feeding, lack of proper housing and high levels of inbreeding.

In spite of this, most farmers opt for traditional rather than intensive farming because of the high input costs associated with the latter.

In areas where traditional pig production is common, the human development index is low and prevalence of poverty and HIV/AIDS is high. Most families are subsistence, resource-poor farmers who have adopted small-scale pig farming to improve their living standards. They characteristically supply pigs to local butcheries rather than to nearby urban areas. The finished pigs are small and underweight.

Commercial pig farms are found within the city boundaries of Nairobi (e.g. Karen and Kahawa), around Nairobi, in Central Province, Central Rift Valley (around Nakuru), North Rift Valley (Eldoret, Kitale), parts of Eastern Province and a few in Western and Nyanza provinces. Most of these farms keep fewer than 2 000 pigs. They supply pigs to local butcheries, urban centres, and pork processing factories - mainly Farmer's Choice (FC).

The improved exotic cross-breeds often farmed in this sector are bred and reared under confinement. The breeding stock is sourced either from FC, large commercial farms or from other small commercial pig farms.

Large commercial pig farms are found around Nairobi (FC– Kamiti and Karen), Kiambu in Central Province (FC– Uplands), and North Rift Valley (FC– Oasis Farm Eldoret). They are also found in Ngong and Kiserian near Nairobi, Thika and Muranga South. These farms each have between 5 000 and 30 000 pigs. Farmer's Choice is involved in the whole value chain. They breed their own stock, raise piglets, slaughter and process pork products. Those in Ngong and Kiserian raise pigs which are slaughtered on the farm. The meat is sold through the farms' butchery outlets in Nairobi. Farms in Thika and Muranga South raise pigs which are mainly sold to FC. Farmer's Choice farms supply about 50 percent of their annual requirements, with the balance being sourced from contract farmers.

The small-scale, intensive pig-raising system is common in Central Province, Central Rift Valley, North Rift Valley, Narok and Eastern Provinces. There are a few smallholder intensive pig-raising systems in Busia, Bungoma and parts of Kisumu in Western and Nyanza respectively. The numbers of pigs kept in these systems vary, at any given time, from fewer than ten up to 100 - the higher figures relating to commercial farmers.

Most of the large-scale farmers mix their own feed rations, while small-scale farmers have formed cooperative societies and opened feed mills, for example Meru Central Cooperative Society. The main ingredient for feed is cereals - especially maize and wheat, with soya and fishmeal used as sources of protein. The feed, whether milled by farmers or by their cooperative societies, is mostly superior in quality and is cheaper than the commercially available alternatives.

3.2 INDUSTRIAL / INTEGRATED PRODUCTION

Farmer's Choice Limited is the only Kenyan company with an industrial/integrated production system. The company is owned by the Aga Khan Foundation Investment Promotion Service (IPS), whose headquarters are at Rose Mark Division Upland in Lari District, Kiambu Central Province. This is the largest farm in the country with between 25 000 and 30 000 pigs. They have other farms in Nairobi (Karen), Kamiti on the outskirts of Nairobi, and Eldoret (Oasis Farm).

3.2.1 Breeding stock / Piglet production

For breeding, Farmer's Choice import their own superior parent stock from Denmark but use the F1 generation for multiplication as they are better adapted than the parents. Currently they have 65 Large White/Landrace/Duroc cross-breeding boars and 2 500 sows, which are the source of breeding stock for FC, supplying cross-breed weaners for raising in their major farms for slaughter. The parent stock is used to supply replacements and a few are sold to contract farmers for breeding. The farms have a monthly output of 3 800 piglets, 3 600 weaners, 3 200 baconers, 120 pregnant gilts and 300 sows.

3.2.2 Fattening

The farm raises the weaners and finishes them as baconers to be sent to their factory at Kahawa West for slaughter and processing.

3.3 INTERMEDIATE (COMMERCIAL) SYSTEMS

3.3.1 Breeding stocks / Piglet production

Sourcing good breeding material is a major challenge in these systems. There is an over-use of good boars which leads to inbreeding, as the female offspring are sometimes mated with the only sire boar available. The cost of a good cross-breed or pure-bred boar and sows or gilts is sometimes prohibitive. In 2010, the costs ranged from US$ 250 for a cross-bred boar to US$ 320 for a pregnant gilt or sow.

Breeding stock is sourced from government institutions such as the Agricultural Development Corporation (ADC) and Kenya Agricultural Research Institute (KARI), or from Farmer's Choice Limited, or from neighbouring commercial farms. ADC, and the KARI farm in Naivasha, used to be sources of breeding stock for these intermediate commercial systems. ADC pulled out while KARI suspended breeding in 2008 owing to lack of market. Farmer's Choice Limited sell some good breeding stock to their contract farmers, so as to enable them to supply finished pigs to the FC factory. These contract farmers sell the breeding stock to other commercial farmers. These medium-sized commercial farms produce piglets which they raise as weaners and on to finishers, to sell for slaughter. Some sell their pigs to pork-processing enterprises such as Farmer's Choice, Meaton Enterprise and Ideal Farm, which add value to the pork, creating a number of finished products in the value chain.

Some commercial farmers around Nakuru, Nairobi and Thika control a further stage in the process by owning slaughter slabs and butcheries in these towns. They raise piglets, slaughter them and sell them at their own butcheries. Their slaughter slabs are also used by other local pork butcheries. Some of these farmers have recently set up and registered a trade association to champion the needs of pig farmers and lobby for government support. The organization is called Kenya National Pig Farmers Association (KENPFA) and is currently recruiting farmers throughout the country. They hope to be involved in the whole production value chain and to act as a forum to address the various challenges affecting commercial farmers.

PICTURE 1: **piggery unit in a small-scale commercial farm in Muranga South District**

PICTURE 2: **A nursing sow in one of the small-scale commercial farms**

3.3.2 Fattening

Intermediate commercial farmers produce piglets which they raise as baconers or fatteners. Their involvement in the value chain ends, either when they sell the finished pigs for slaughter outside the farm, or when they sell the meat in their butcheries after slaughtering them on the farm.

These intermediate commercial farmers tend to use commercial feeds (mainly pig finishing meal) to finish the pigs. A few own factories where they produce their own feeds. Others buy the raw materials for home-made feed rations, which are usually cheaper and better than commercial feeds.

3.4 SCAVENGING OR BACKYARD PRODUCTION

In the scavenging or backyard systems, pigs are left free to roam. A number of levels of free range and scavenging styles can be distinguished, depending on the periods for which they are free and whether there is any input/ supplementation given to the pigs.

At one extreme is the free range system practiced in the slums of the major cities and urban areas, in various garbage dumps. The pigs are owned by people who do not own land, and the pigs depend wholly on refuse and garbage deposited in these areas. They usually feed on swill, kitchen leftovers, market-spoiled foods, vegetables and fruits, and any other edible material in the garbage. It is common to see pigs in the rubbish heaps around homesteads, chasing the garbage lorries that ferry refuse to the various dumps, and rooting through garbage at the dump sites. This is a low- or no-investment system. The owners invest in a sow and when she farrows, they mark the piglets by ear notching. The piglets are raised in the garbage until they are ready for market and slaughter. The owners then marshal the pigs and sell them as they are, at a low price, or in some cases (for instance in Nakuru Town) they take the pigs home to wash them with water before selling them for slaughter. Sometimes pig traders buy the animals in this condition at low prices and, by housing them, giving them anthelmintic and commercial feeds, they are able to clean them up and sell them - at a profit - for slaughter.

Another type of free range production is where the pigs are released in the morning to roam and scavenge throughout the day, returning in the evening for shelter and supplementation with kitchen leftovers and water; or confined during the day and released to scavenge overnight. They scavenge in garbage pits, sewage drainage channels, open fields and sometimes agricultural fields. This type of free range pig-rearing is a recipe for neighbourhood conflict and is a menace and nuisance in many cities and municipalities. In recent times, pigs have been shot in Nakuru, Thika, Eldoret, Homabay, Busia and Nyahururu Towns for scavenging in this way.

Large numbers of pigs straying from the London dumpsite in Nakuru, to root among the crops at neighbouring G.K. Prison farms, end up as meals for prisoners. The pigs are rounded up by the authorities and confiscated. As the owners tend not to claim them, they are stunned and slaughtered with the facilitation of the KSPCA and the office of the DVO. After inspection, the meat is given to prisoners. Owing to low or non-existent biosecurity measures, these first two free range systems carry a high risk of incubating outbreaks of, and mortality from, African swine fever (ASF).

A third type of free range pig-keeping is practiced by small-scale, resource-poor farmers in Western Kenya and Nyanza. In these systems, farmers own anything from two to five pigs, including a sow and a grower/fattener. Some farmers specialize in producing piglets which are sold to other farmers at the age of two months. Those farmers then either raise them for slaughter as fatteners or finishers, or raise them for breeding purposes, supplying piglets to other farmers. The pigs in this system are tethered around the homestead especially during the plant-growing season. They are released during harvesting and post-harvesting to roam until the next planting season. They are not housed, and feed themselves on pasture, kitchen leftovers and some crop by-products such as cassava, sweet potato tubers and vines. The pigs are usually small in size owing to prolonged underfeeding, and there is a lack of genetic improvement because of inbreeding. The pigs take up to two years to reach a market weight of between 50 and 70 kg. A notable characteristic in these areas is that latrines are often not used, even where they exist. It is a major risk factor for Taenia solium cysticercosis and taeniosis in humans, and porcine cysticercosis.

This system may be referred to as traditional free range as it is entwined with the traditions of the local people. The people of these areas have been keeping pigs for a long time and it is common for a homestead to keep a pig for security purposes and for protection from evil spells and witchcraft. The ready market for pigs in these regions means that most are sold at home. Pig traders and butchers move from homestead to homestead and from village to village looking for these pigs. The prices they offer are low and exploitative.

The free range system of Western Kenya and Nyanza has great potential for development. The willingness of farmers and availability of local feed materials can be capitalized on to develop the free range pig sector here.

Most of these pigs are slaughtered at the local butcheries and some find their way to slaughter houses in the large urban centres through pig traders and brokers.

3.5 CASE STUDIES

3.5.1 Case study one

Date of case study: 21 September 2010

Area location: Ndhiwa District, Riana Division, Ombo Location

GPS coordinates: S 00 43 45 5 - E 034 27 18 3

Description of the location:

Rural area in Homabay County near the shore of Lake Victoria, characterized by poor infrastructure and a low human development index, with very few people attaining tertiary-level education.. The soils are black cotton, holding a lot of water during the rainy season and cracking during the dry season. Homesteads get water from shallow wells, small rivers and seasonal dams. Farmers grow subsistence crops - mainly maize, millet, cassava and sweet potatoes. Pig production plays a major role in the economic livelihood of these homesteads. In addition to pigs, they also keep some chickens, cattle, sheep and goats.

Description of the pig sector at this location:

Free range pig-keeping is the norm here, where pigs are left free during the harvesting and post-harvesting season and tethered under a tree or next to the cowshed during the planting and growing seasons. The pigs are small, owing to underfeeding, and are fed on whatever is available - including kitchen leftovers, pastures, spoiled tubers, traditional brewers' waste and sugar cane. The pigs are cross-breeds whose varied coat colours are a sign of inbreeding and static genetic improvement. The very few boars in the area are shared, hence the high degree of inbreeding. These pigs were introduced from Asumbi Mission in the early 1950s and have been bred with other pigs from Kisumu, Uganda, Mbita and Busia. Most homesteads keep a sow and piglets. The pigs are prolific and a sow will give birth 9 to 14 piglets per year. The sows farrow in the open and sometimes under insanitary conditions. Piglets are not given iron injections. No special care is given to nursing sows nor to their piglets. Piglets are sold, aged two to three months, to other farmers who raise them for slaughter. These pigs reach a market weight of between 50 and 60 kg within two years. Most are bought by pig traders who move from homestead to homestead and village to village and accumulate up to 40 pigs each, before transporting them to Ndumboini slaughter house near Nairobi. A local butcher slaughters a few pigs at the local open slaughter slab. These pigs are not inspected and the butcher hawks the meat to prospective customers during market days in the surrounding local centres.

PICTURE 3/4: **A litter of piglets at a small-scale farm in Ndhiwa District, Homabay County**

3.5.2 Case study two

Date of case study: 27 September 2010

Area location: Rongai Division, Nakuru, Kiamunyi Village

GPS coordinates: S 00 15 57 9" - E 036 02 12 3"

Human / Pig population figures: 152 565 / 13 894

Description of the location:

Intensive smallholder farm of about 3.5 hectares of sloping land on the northwest outskirts of Nakuru Town, off the Kapsabet Road. The farmer grows maize in the red soils and also practices agroforestry.

Description of the pig sector at this location:

At this commercial pig-raising enterprise, the farmer raises and slaughters his own pigs. He has a slaughter slab on the farm, a feed factory in town and a pork butchery in Nakuru Town. The pigs are housed in standard units and separated according to age and production status. They are fed on commercial feeds from the owner's factory in town. At the time of visiting, there were two pregnant sows about to farrow, two sows that had farrowed a total of 22 piglets, and two nursing sows. There were several weaned piglets and a number of grower pigs at various stages of finishing. These were kept in individual clean houses. The farm had two mature boars which were housed separately..The pigs were given water ad libitum, and feed according to their production status. The farmer was supplementing the growers with market waste from the main municipal market - primarily spoiled fruits and cabbages, along with swill from hotels in town. He was supplementing the pigs by boiling pig blood and intestines from slaughter. The farm had 16 sows and 85 weaners between two and five months old. There were no finishers. He was relying on other farms for the supply of slaughter pigs for his slaughter slab and butchery in town.

Pork value chain analysis on this location (See Figure 9)

3.5.3 Case study three

Date of case study: 21 September 2010

Area location: Kibera, Langata Division, Nairobi, West District

GPS coordinates: S 01 30 327 - E 036 78 56

Human / Pig population figures: 200 000 / 12 891

Description of the location:

This slum in the western part of Nairobi City is inhabited by low-income workers, most of whom work in the informal sector as casual labour. Their dwellings are illegal and temporary, with mud walls and roofs made of rusted cast iron or plastic sheeting. The density of these settlements is extremely high with only narrow paths between the houses. They are not connected to the sewer system (although the sewer lines passing through the area commonly burst), and most households lack toilet facilities (flying toilets – where plastic bags of human waste are thrown onto a neighbour's roof – are a frequent hazard). Other basic infrastructure is also lacking. Water is obtained from a central point. The government is implementing a project to upgrade these slums by building better and more permanent houses in this area. Several households own pigs which roam and scavenge on garbage disposal sites in the area, sewage drainage channels and the banks of a nearby highly-polluted dam.

Description of the pig sector at this location:

The free range pig-raising system here involves pigs roaming and scavenging in garbage dumps, sewage tunnels and along the banks of a highly polluted dam in the area, as well as in dirty pools of water. They feed on garbage, pasture and any edible leftover materials in the vicinity. There is no supplementary feeding. Owners identify their pigs through ear notching. The pigs often come near the homestead and may be found resting outside the house. The system is illegal and a great concern for the Department of Veterinary Services. The pigs are a menace, sometimes wandering out of the area to neighbouring estates where the city council, without suitable pig pounds or clear legal procedures, is not able to confiscate them, and the owners tend not to reclaim them.

PICTURE 5/6: **Free range pigs scavenging at a garbage dump site in Kibera slums, Nairobi**

Pork value chain analysis on this location (See Figure 9)

3.6 PIG FEEDS

3.6.1 Local feed resources

The main resources for feeding pigs are cotton seed cake and prairie meal, with gluten feed as a source of protein. Pigs are in competition with humans for maize, their main source of energy. Other energy sources include milled by-products such as the bran from wheat, maize and rice, along with maize grain, wheat grain and semi-refined oil. Limestone is the main local mineral source. Although there is no shortage of animal feed in Kenya, the cost is high and in some areas quality is not the best. Concentrates, for instance, are available but very expensive. The cost of feed has increased by 450 percent in the last three years (KENPFA). The main feeds types manufactured are Pig Creep pellets for piglets, Sow & Weaners for breeders and Pig Finisher for fatteners. Sow & Weaner, which is preferred by most farmers, is produced in the highest volumes by most companies. Challenges facing this area include a poor quality and high cost of ingredients as well as concentrates; inadequate and hard-to-access mineral supplementation; unavailability of local sources of vitamins, amino acids, macro- and micro-nutrients; frequent drought. The main local producers of pig feeds are: Unga Feeds; Ngeca Feeds; Sigma Feeds; Belfast Millers; Wann Feeds; Pembe Millers; Mombasa Maize Miller; Chania Feeds; Ngae Feeds Nakuru; Uzuri Feeds Nakuru.

TABLE 4:

Average retail prices ranges for commercial pig feed

Feed type	Price (US$ per 70 kg bag)[4]
Creep Feed	22 – 25
Sow & Weaner	20 – 22
Pig Finisher	18 – 20

Source: Interview with various retailers, September 2010

3.6.2 Imported feed resources

The main pig feed manufacturers import as source of protein are soya feed premix from Europe and India; sunflower and cotton cake from Tanzania and Uganda and fish from Tanzania. The following energy sources are imported especially in years when the country experiences famine: maize from Tanzania and COMESA countries (in 2009, Farmer's Choice imported maize from Argentina); wheat grain from Tanzania; rice bran from Uganda, vitamins, mineral supplements and trace minerals in pig feeds are imported from Europe.

3.6.3 Use of crop residues / by-products

Many commercial pig farmers also grow food crops, the surplus produce or by-products which can be used to feed the pigs. This food source plays an important role in pig feeding, especially in free range and small-scale production systems. Crops and by-products include sweet potato vines, kales, cabbages, Napier grass, sugar cane cuttings, sugar cane tops, garden weeds, mangoes, tomatoes, oranges, avocadoes, peelings and market by-products/waste. The use of feeds such as cereal residues, cassava and potatoes has been shown to save up to 20 percent on feed costs for growing pigs and 50 percent for breeding pigs. Other by-products include brewers waste, rumen contents and slaughter blood from slaughter slabs. These are either given to the pigs as is, or mixed with kitchen leftovers. Some farmers also cook the blood and mix it with ugali (cooked maize meal).

Another source of feedstuffs for pigs is swill from schools, hotels and government institutions. Farmers around these institutions collect the leftovers to feed their pigs. Some institutions, especially schools and prisons, feed their own pigs with the available kitchen leftovers. The drawbacks are that the safety, amount and quality of feed is not guaranteed and pigs fed inadequate and unbalanced diets will have low weight gains.

[4] Exchange rate at September 2010: US$ 1 = Kshs 80.25

PICTURES 6/7: **Free range pigs (with other animals) at Nakuru Municipality's London dump site**

PICTURE 8: **A tethered pig feeding on sugar cane cuttings in the traditional free range system**

PICTURE 9: **Free range pig eating grass at a farm in Ndhiwa District – Homabay County**

PICTURE 10: **Piglets feeding on cassava peelings**

PICTURE 11: **Pig feeding on kitchen leftovers**

3.6.4 Feed baskets

Feeding constitutes the greatest cost in raising pigs and affects the pig's performance and sustainability of the sector. Pigs are able to survive on a variety of different feedstuffs.

In the free range systems common to Nyanza and Western Kenya, pigs are primarily fed on pasture grasses of various types, crop residues, crop by-products, cassava, sugar cane, sweet potato tubers and vines, ugali and kitchen leftovers.

Sweet potato tubers and vines are frequently fed to pigs in these areas with the vines providing, if used appropriately, a year round source of pig feed. Farmers are encouraged to plant dual-purpose varieties of sweet potato tubers which are rich in carbohydrates, vitamins and minerals.

Uncooked peelings of sweet potatoes, cassava and bananas from household consumption are given to the pigs, as well as whole cassava or sweet potatoes (either raw or cooked), and posho mill waste (fagia) which is cooked and may be mixed with kitchen leftovers and offered to the pigs. Kitchen leftovers contain many of the essential nutrients required for a healthy balanced diet. Their composition has been found to be adequate in protein and energy but low in dry matter content, which affects growth in younger animals and should be addressed by supplementing with other feeds.

Some farmers supplement their pigs with small quantities of omena (a small dried fish – Rastrineobola argentea) which in addition to being a protein source they believe to be a dewormer. Blood contains up to 80 percent protein and is another source of easily digestible protein for pigs. The contents of the rumen of slaughtered cattle have also been found to have a good crude protein composition, suitable for pigs.

The pigs are either tethered and the feed brought to them, or they are left to roam and feed from various sources. Sometimes the pigs are untethered and taken to surrounding marshy and watering areas for a bath and to feed on earthworms as a source of protein - although these excursions are as often a source of infection by ascarids and lungworm.

A recent study in Busia and Kakamega Counties showed that only 40 percent and 30 percent, respectively, of farmers there provide water to their pigs – and those that do so generally provide waste water from the kitchen at the time of feeding, mixed with the feed being provided. Most farmers feed their pigs no more than three times a day, with the majority feeding the pigs twice a day, morning and evening.

In the complete free range/backyard system found in slum areas around major towns and cities, the pigs roam garbage heaps, pits, disposal areas and dump sites where they eat any edible by-products, swill and domestic waste.

In some small-scale commercial system common in Central, Eastern, Central and North Rift Valley and parts of Western and Nyanza Provinces, pigs are fed on commercial feeds and supplemented with swill, kitchen leftovers, market by-products/ waste and crop residues. Most farmers provide the pigs with crop residues as feed, bedding and also a source of organic farmyard manure. The pig houses are not concreted and the pigs root in them.

Piggeries are often established near official institutions owing to the availability of swill. However, there are small-scale commercial farmers in these areas who feed their pigs exclusively on commercial feeds. The pigs are fed twice a day according to their age, production status and type of feed. The piglets are fed on starter (Pig Creep) pellets. The weaners, sows, boars, gilts and early fattening stage pig are fed on Sow & Weaners meal while the baconers/finishers are fed on Pig Finisher meal. Most farmers will have a feeding table as shown below from the Department of Livestock Production. Some small-scale farmers have formed cooperatives to manufacture cheaper and higher quality pig feed.

In the large-scale commercial pig-keeping systems common in Central Kenya, Nairobi, Central and North Rift Valley, the pigs are fed on commercial feeds according to age and production status. Piglets are fed with starter/Pig Creep pellets. The weaners, sows, boars, gilts and early fattening-stage pigs are fed Sow & Weaner meal while the baconers/ finishers are fed Pig Finisher meal. Most farmers use Sow & Weaner feed across the board, with the recommended amount given over the course of the day, usually morning and evening. The feeding regime generally follows that set out in the recommendations from the Department of Livestock Production, as shown below.

TABLE 5:

Recommended feeding regime for pigs

Age (wks)	Weight (Kg)	Feed/day (Kg)	Feed type
8 – 10	12 – 15	0.66	Sow & Weaner/Starter
10 – 12	15 – 20	1.0	Sow & Weaner
12 – 16	20 – 40	2.0	Sow & Weaner
16 – 18	40 – 50	2.5	Finisher
18 – 24	50 – 84	3.0	Finisher
24 – 28	84 – 105	3.0	Finisher

Source: Ministry of Livestock Development – Livestock Production Division

The largest commercial pig enterprise, Farmer's Choice, makes its own feed for its farms, which it also supplies to some of its commercial contract farmers. In these cases, its field officers monitor and advise on feeding, to produce quality finished pigs. The company imports Creep Feeds from Britain.

Chapter 4

Trade, marketing and markets

4.1 DOMESTIC MARKET

4.1.1 Animal trade markets

There are livestock markets in all areas of the country but, unlike for other livestock, there are no live pig markets in Kenya. Animals brought to market include cattle, sheep, goats, donkeys and camels but not pigs. Live pigs are traded on farmers' premises. The farmer calls the trader, or traders visit the farmers, especially in the traditional free range systems where traders move from village to village looking for pigs.

Farmer's Choice Limited does not buy live pigs. Farmers transport live pigs to the factory and are paid according to cold dressed weight (CDW) after slaughter.

Farmers buying weaner pigs get them from other farmers whose sows have farrowed. The few breeders provide breeding stock. The National Pig Breeding Unit at KARI, Naivasha used to sell breeding stock to farmers regularly but breeding was suspended in 2008. There is hope that it will be revived but for the time being there is no organized or regular sale of stock. In the meantime, there is a drive to organize pig farmers into groups and cooperatives able to organize and manage live pig trade markets.

4.1.2 Slaughtering facilities

There are four main slaughter facilities in Kenya.

Farmer's Choice Limited

Kenya's largest abattoir is located at Kamiti, on the outskirts of Nairobi City. This facility combines slaughtering and processing, and is a private company established in 1975 as Kenya Meat Processors Ltd. - a subsidiary of the Block Hotel Group. The original purpose was to supply the Group's hotels with reliable pork products. In the late 1980s, Farmer's Choice acquired an export license when it built a slaughter and processing plant licensed for export by the Kenyan Government. Farmer's Choice was acquired by Lonrho in 1989 and has since 2001 been owned by IPS (Industrial Promotional Services) as part of the Aga Khan Development Network.

Farmer's Choice acquired BVQI (Bureau Veritas Quality International), Hazard Analysis Critical Control Point (HACCP) and Total Quality Management standards accepted by export partners. The FC factory is currently HACCP-certified and is inspected annually. It is connected to the Nairobi Water and Sewerage Company main line and has a borehole to supplement the water supply. It also has an effluent treatment plant, the sludge from which is used as manure. The offal from slaughter is made into pet food. The factory slaughters 400 pigs per day and processes 350 pig carcasses per day into products such as ham, bacon, sausages and burgers. Fifty percent of the carcasses come from FC farms while the rest are supplied by contract farmers (of which there are currently about 120 nationwide, most of whom are based within a 100 km radius of the factory) or other pig farmers.

Products from the factory has a number of outlets in the domestic market: tourist hotels around Nairobi (20%); tourist hotels at the coast (10%); lodges and institutions (5%); major supermarkets (Uchumi, Nakumatt, Tuskys) (15%); other mass markets (kiosks, retail outlets) (50%). The company has its own refrigerated vehicles which transport over 90 percent of the products to various destinations in Kenya and neighbouring countries. Private vehicles and major customers transport the remaining 10 percent (S. Mbugua, FC Production Manager, personal communication).

Ndumboini Farm slaughter house

This dedicated abattoir, established in 1972, is located in Kiambu County, Kikuyu District on the western outskirts of Nairobi. It is located on a private farm owned by David Kiarie, and receives pigs from Malaba, Bungoma, Kimilili and Busia in Western Province; Kisumu, Homabay and Migori in Nyanza; Nakuru, Kitale, Kajiado, Ngong and Eldoret in the Rift Valley; Thika, Nyeri, Kiambu, Kabete and Muranga in Central; and Ruai, Kibera and Dandora slums in Nairobi. No pork processing is carried out at this abattoir.

PICTURES 12/13/14: **Ndumboini slaughter house on the outskirts of Nairobi**

The facility has a capacity to slaughter 40 to 50 pigs per day, most of which come from Kiambu and surrounding areas, with a significant number coming from Nyanza. One pig trader transports 40 to 80 pigs here every week from Homabay and Migori districts. These pigs have a variety of skin colours and are seen in the overnight holding pens. Ante mortem inspection is carried out before slaughter.

PICTURES 12/13/14: **Ndumboini slaughter house on the outskirts of Nairobi**

The abattoir is regularly inspected by the Department of Veterinary Service - Hygiene, under whose license they operate, clean and dirty operations are kept separate, and strict regulations adhered by all in and around the site. Adequate water is supplied via a borehole. Hot water is used for scalding and on the slaughter floor. There is an effluent treatment plant, the sludge from which is used as manure for the farm crops. The intestines are cleaned and sold for human consumption. This abattoir is the main supplier of pork to most of the butcheries in Nairobi city centre, as well as its estates and outskirts. Some meat is transported to butcheries in Thika and Kitengela. The meat is transported in well-labelled clean containers by bicycle, motorcycles and four-wheeled vehicles (mainly pickups). Oscar Food Industries, Chefs Choice and Olive Enterprises (Limuru) buy carcasses from Ndumboini Farm slaughter house for processing at their premises into value-added products such as sausages and burgers.

Lyntano slaughter house

Located on the northern outskirts of Nairobi, off Kiambu Road, Lyntano's was built in 1950 as a duck abattoir before switching to pigs. It is on the site of a coffee farm and slaughters between six and ten pigs a day from Ruai, Dandora, Mathare and Embakasi in Nairobi; and from Limuru, Ndumberi and Kiambu Town in Kiambu. The abattoir is well-constructed, well-maintained and clean. A borehole supplies adequate water for cleaning, and the Department of Veterinary Services – Hygiene (Nairobi) regularly inspects and issues licenses. Blood by-products go into a disposal tank while ingesta are used as farm manure and intestines are cleaned and sold for human consumption. Outlets for the carcasses include Nairobi City Market butcheries, several hotels, popular entertainment places and supermarkets. Clover Foods and Lemok Enterprises source pork for their products from Lyntano slaughter house.

PICTURES 18/19: **Lyntano slaughter house on Kiambu Road, Nairobi**

Kabati slaughter house

Kabati abattoir is located in Muranga South off the dual carriageway between Thika and Kenol. Cattle, sheep and goats are slaughtered in one section while pigs are slaughtered in the other, keeping the two operations separate. The facility is well-constructed and maintained, with separate areas for the clean and dirty operations and an adequate supply of water from a borehole. It is inspected and licensed by the Department of Veterinary Services. Operation areas are clean, sludge from the effluent treatment plant goes into farmyard manure, and offal by-products are used for human consumption. The abattoir kills between 18 and 25 pigs per day, limited only by the shortage of pigs for slaughter. Most of the pigs are supplied by small-scale farmers in the district, with a few from Thika, Machakos, Nyeri, Nyahururu and Kirinyaga and Kitale. Traders sometimes slaughter underweight pigs to meet demand. The main market for the carcasses is Thika Town which is thought to lead Kenya in pork consumption and has many pork butcheries and eateries. One pork outlet, Thika Pork Centre, retails an average of 500 kg per day through four butcheries in the town.

PICTURES 20/21: **Kabati slaughter house – Muranga South**

Other slaughter houses / slabs

Large and medium pig commercial enterprises around Nairobi (Ngong and Kiserian) and Nakuru have their own slaughter slabs licensed and inspected by the Department of Veterinary Services, where they slaughter their own pigs and sometimes those of the neighbouring small-scale farmers. These enterprises own butcheries in Nairobi (Kenyatta Market) and Nakuru (Utugi and Ngae) where the pork is sold. Pig-raising areas in major cities, towns and rural districts generally have several slaughter slabs varying in type and hygiene standards. One style is a simple pole structure in the open air where the carcasses are hanged and flayed. Another type is an open concrete structure with a killing floor, while still others are roofed and equipped with a disposal and condemnation pit.

PICTURE 22: **Open slaughter house in Busia County (Kagira et al. 2010)**

PICTURE 23: **Open air slaughter slab in Ndhiwa District, Homabay County**

PICTURE 24/25: **Popular pork eateries. Note the advertisements**

Meat inspection at most of these slaughter slabs is carried out by the Department of Veterinary Services, although it was observed that no inspection was performed in open air slaughter slabs common among the free range traditional systems. Here butchers slaughtered their pigs and sold them, with no license or inspection, at the pork butcheries and eateries dotting the town centres and residential areas.

4.1.3 Value chains

About 20 percent of the meat consumed in Kenya is poultry and pork. According to the 2005 Export Processing Zone Authority (EPZA) Report, Ken Chic and Farmer's Choice are the two main players in poultry and pork production respectively. Hoping to stimulate the market for value-added products, the Kenyan Government has been encouraging the private sector and local authorities to establish small abattoirs and meat-processing facilities.

FIGURE 9: **Formal pork centers supply chains**

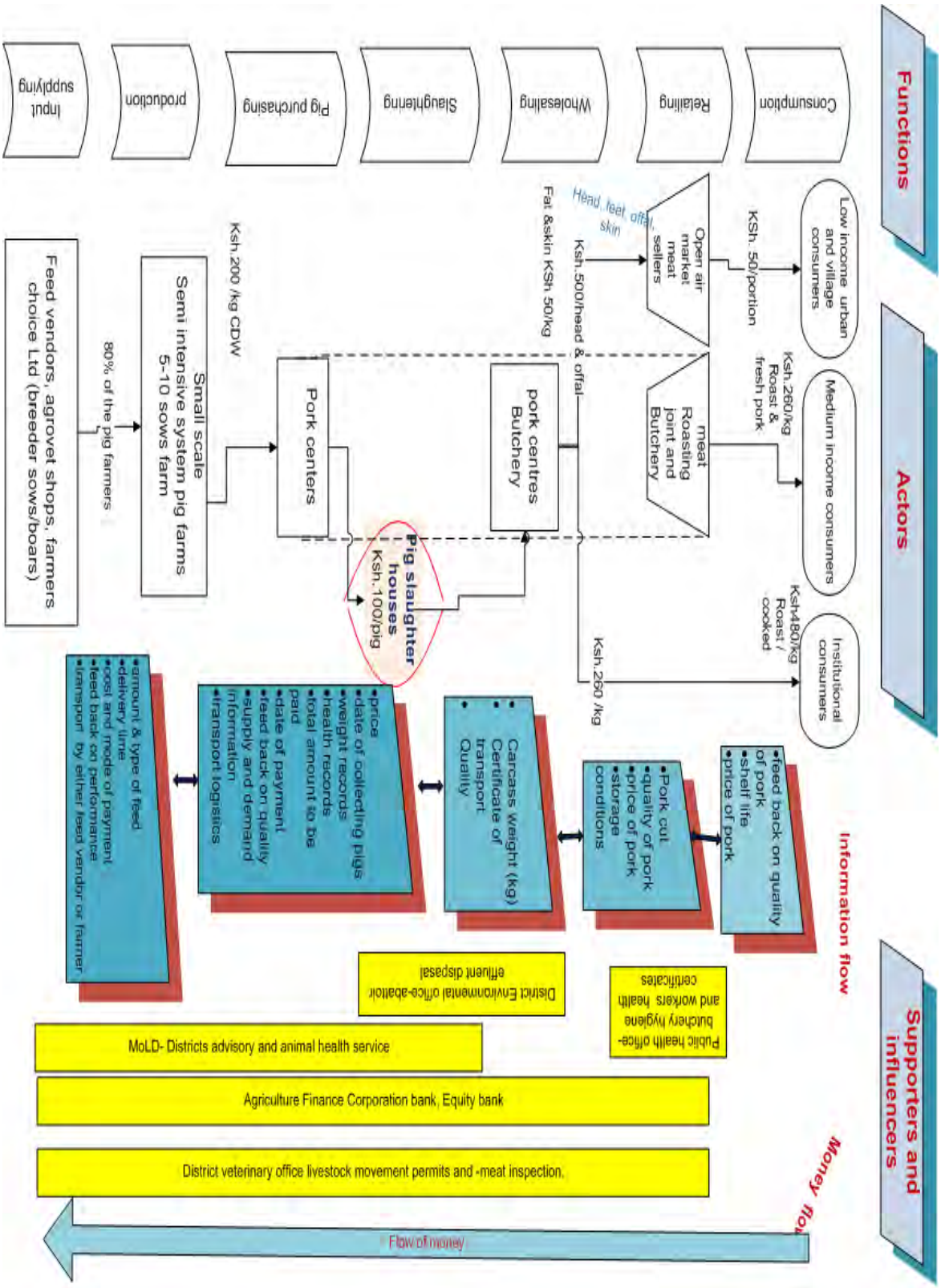


FIGURE 10: **Traditional free range and scavenging systems**

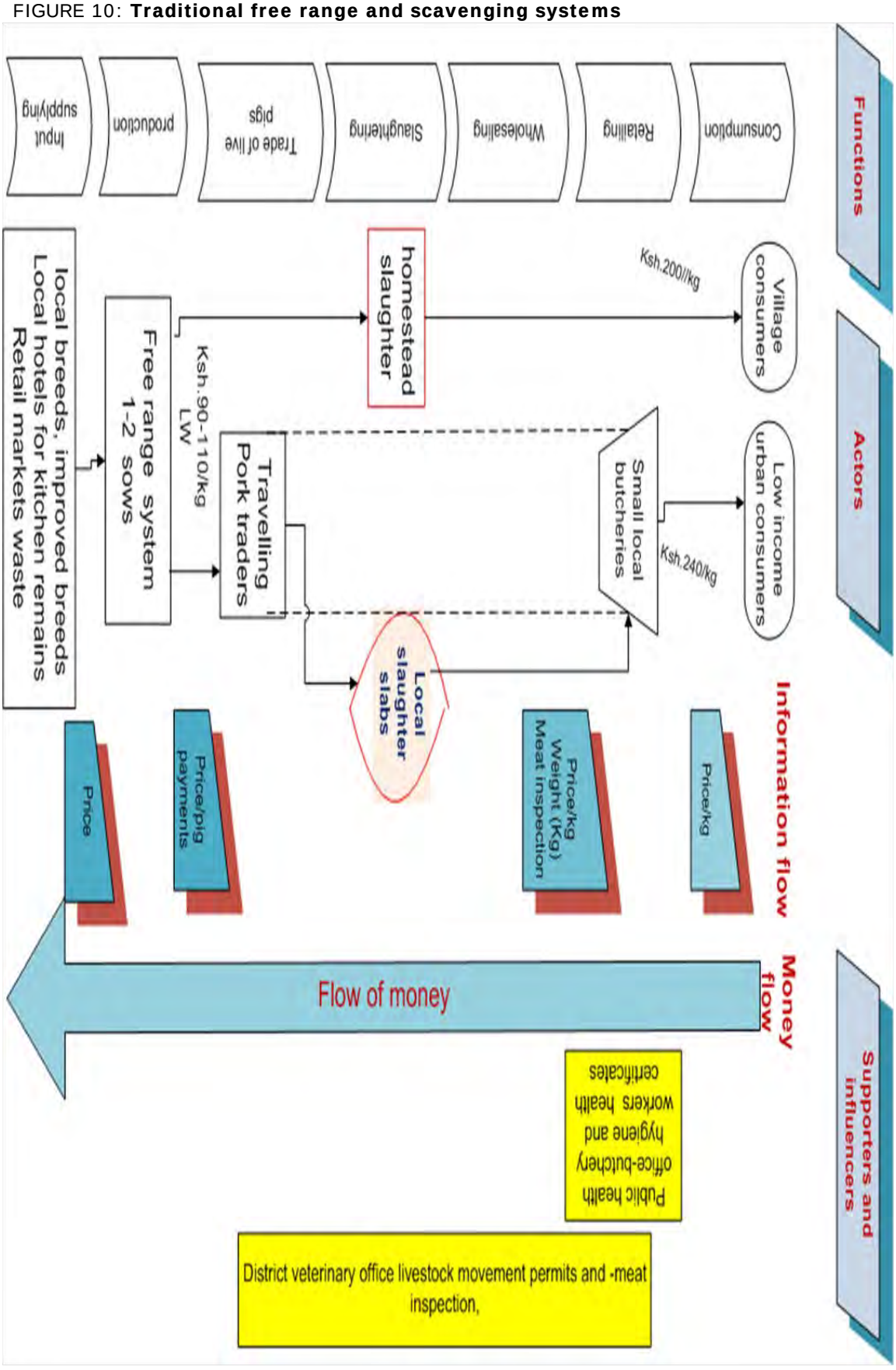
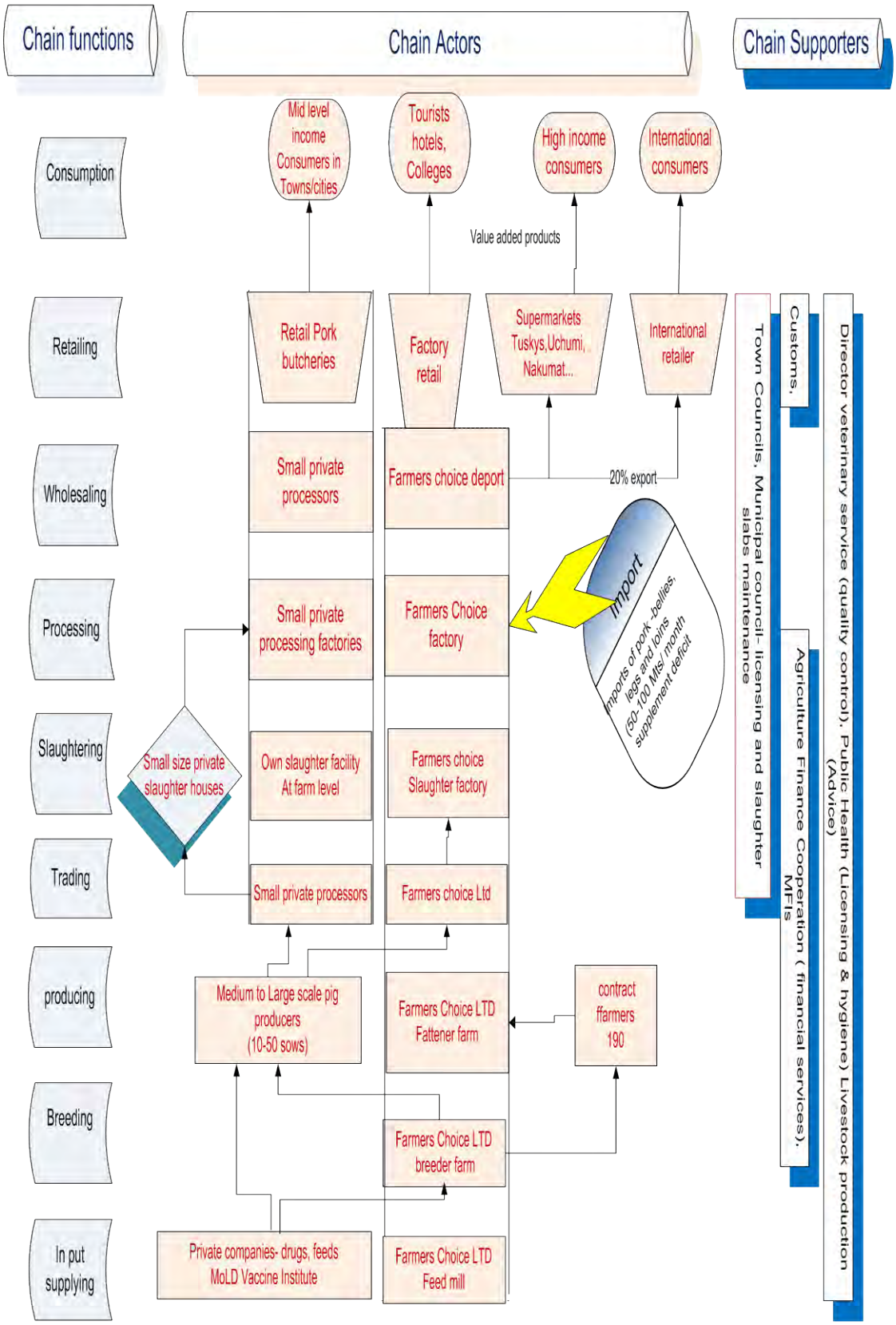


FIGURE 11: **Value Chain - Industrial / Integrated and Commercial Systems**



Some farmers specialize in piglet production and sell the weaners to other farmers who finish the pigs (farrow-to-weaner). Others buy weaned and growing pigs which they keep and fatten for slaughter (weaner-to-finisher). Piglets are sold at between six and eight weeks old at a cost of between US$ 5 and US$ 10. These other farmers raise the weaners and sell them after up to two years at a mean (farm gate) price of between US$ 30 and US$ 47, earning a profit of around US$ 24 per pig sold.

The traders who buy them operate by moving from homestead to homestead, eventually selling most of the pigs to butchers at a profit of between US$ 20 - 30. They also assemble a number of finished pigs to be transported to Ndumboini slaughter house where the profit is between US$ 50 and 100 per carcass. Among small-scale pig farmers in some rural areas, a farmer notifies neighbours before he slaughters a pig, and requests that they book the amounts they wish to buy. If the farmer gets enough booking in terms of weight, the pig is slaughtered, inspected and the booked amounts distributed to the neighbours. The biggest challenge is that some neighbours do not pay immediately.

In Western Kenya, among the traditional free range systems, a farmer informs neighbours about slaughtering a pig by means of a hilltop drum. The neighbours get the message and come for various amounts of the uninspected meat.

There are more players involved. The issues of policy, biosecurity and biosafety are emphasized. The system is well-organized and value is added to every product along the value chain.

4.1.4 Main trade routes

These are governed by the location of slaughter houses and major markets. The type of pig production system is also a factor.

A proliferation of small firms processing pork at various levels in Kenya's major towns has improved the market situation and is encouraging local communities to eat this meat. Previously, over 80 percent of pork and pork products were consumed by the rich and by tourists but this consumption pattern is now changing.

In Western Kenya and Nyanza's free range traditional systems, butchers and pig traders move from homestead to homestead and village to village buying slaughter pigs. Some are slaughtered locally while other are transported to Ndumboini slaughter house near Nairobi.

In the small-scale enterprises, the farmers will inform the traders and butchers when their pigs are ready for slaughter. Others will visit Farmer's Choice and secure a supply order when the pigs are mature. FC's contract farmers will supply pigs in line with the contract, after inspection by field officers. Pigs are moved from the farm to the slaughter slabs and slaughter houses.

Live pigs are transported by truck from western Kenya and Nyanza to Kiambu West slaughterhouse. Farmer's Choice moves pigs from North Rift Valley, Kiambu and Nairobi to their abattoir in Kamiti.

In Central Province, Eastern and Central Rift Valley (Nakuru), trade routes branch out from the abattoirs, with the pork being transported by container by bicycle, motorcycle and vehicles to various market butcheries where consumers buy meat.

Farmer's Choice and various smaller pork processing companies create a variety of value-added products from the slaughter house pork. Farmer's Choice sell to the export market while the remainder sell their products in the local market.

Pig markets are mainly found in urban areas. FC takes about 80 percent of the pigs on offer. Smaller market outlets include Oscar Foods, Gourmet Bacon, Nairobi Airport Services, Chef's Choice and Kenya Cold Storage. Small butcheries in major towns are beginning to take off, and some enterprising farmers are looking for export markets in the region and beyond.

Pork barbeque joints are also becoming common in a number of urban centres such as Thika, Nyeri, Kerugoya, Nakuru, Eldoret Trans Nzoia, Kakamega and Kajiado.

4.2 IMPORT

Kenya imports most of its pork from Brazil and Canada, and most of its processed products from Italy, as shown below. The main importer of pork is Farmer's Choice, which processes the imported meat into value-added products for the export market, such as

bacon and ham. Imports are regulated by the Department of Veterinary Services and are allowed from certified countries. Import licenses are issued after a risk assessment of the original source of the imports.

TABLE 6:

Imports of pork and pork products

Product	Country of origin	Name	Company importing	Volumes(MT)
Pork	Brazil	Pork belly	Farmer's Choice	175 (2008) 164 (2009) 175 (October 2010)
Pork	Canada	Sirloin and leg	Farmer's Choice	50 (2008) 50 (2009) 21 (October 2010)
Pork	Germany	Spare rib	Farmer's Choice	25 (October 2010)
Processed	Italy	Salami	Several	Various quantities

Source: Department of Veterinary Services – Import / Export office – November 2010

4.3 EXPORT

In the last few years, Kenya has been exporting more pork products than beef, mutton and goat meat combined. Farmer's Choice, the leading processor and distributor of pork products in Kenya, exports about 2 000 tonnes per year (20 percent of its total production) to fifteen countries across Africa, the GCC (Gulf Cooperation Countries) and the Indian subcontinent. Twenty five percent of the total Farmer's Choice factory output of processed pork products is exported. These include special cuts of meat, value-added pork products such as ham, bacon and sausages.

Among COMESA and non-COMESA countries, the largest share of pork exported from Kenya goes to Tanzania which takes over half of the exports per month. Farmer's Choice products are sent by land, sea and air, from the factory to destinations worldwide.

TABLE 7:

Export of pork and pork products

COMESA COUNTRIES	NON-COMESA COUNTRIES
Tanzania	UAE
Uganda	Bahrain
Eritrea	Ghana
Ethiopia	Nigeria
Djibouti	Indian subcontinent
Mauritius	Oman
The Democratic Republic of Congo	Netherlands (10 000 tonnes twice a year)
Rwanda	
Zanzibar	

Source: Department of Veterinary Services – Export / Import Office November 2010 and www.farmerschoice.co.ke – See map on page 56 (Annex III)

Chapter 5

Socio-economic indicators

5.1 CULTURAL BACKGROUND INCL. TRADITIONS AND RELIGION

The pig keeping tradition in Busia started when the Samia migrated from Uganda in the seventeenth century. In this tradition, a young boy is expected to visit his uncle who will give him a female piglet as a gift. The boy takes the piglet home to his parents to be raised.

No preparations are made to house or feed the piglet; it is fed on kitchen leftover and pasture.

Among the Luo of Nyanza, farmers have plenty of land for pigs to roam and scavenge on, and they keep pigs because they are easy to sell and have a short reproductive cycle. They believe that keeping a pig in a homestead guards against witchcraft and acts as a security guard. Children are anointed with lard to protect them against ill omens. Pork is also thought to boost the immunity of those infected by HIV/AIDS. Farmers believe that a pig's feeding habits insulate it from passing diseases to people. The thinking is that, as pigs eat a variety of feeds from different sources, their flesh accumulates essential 'elements' that prevent it from transmitting diseases to humans.

In Central Province, some farmers keep pigs for providing farmyard manure, and to make use of crop residues and by-products including kitchen leftovers. Farmers keep one or two growers to sell for slaughter when they mature or when the family needs money.

Pigs are kept by people of every religion other than Islam. According to the 2009 population census, the pig population distribution in Kenya reflects this, with most pigs concentrated around Nairobi, Central, Western, Nyanza and Rift Valley Provinces which are predominantly Christian, and very few in the Muslim-dominated Coast and North Eastern Provinces. There are more pigs in Coast Province (5 243, KNBS) owing to the influence of the upcountry Christians, than in North Eastern Province (68, KNBS). Even the 68 was a surprise and may reflect changing traditions if non-pig keeping communities are now keeping pigs.

The norm has previously been that, even outside Coast and North Eastern Provinces, people tend not keep pigs wherever Muslims reside and have some influence. In some areas they are able to influence the administration and are credited with the ban of free range pigs in some urban areas in Western and Nyanza Provinces.

Among Christians, the Seventh Day Adventists and strict Anglicans do not keep pigs or consume pork. Regions where these groups dominate have few pig farmers and no pig slaughter slabs or butcheries.

There are others who have the attitude that pigs are dirty animals – possibly arising from seeing free range pigs at garbage disposal sites. They will neither keep pigs nor eat unprocessed pork. This belief that pigs are dirty and can eat anything should be clearly addressed. Pigs are clean animals but can be messy if maintained in an unclean environment. Pig can eat anything if left without food.

5.2 TIME ALLOCATION

Pigs receive a lot of attention in the commercial pig production sector. The farmers who specialize in this sector are market/income-oriented, investing a lot of time in breeding, feeding, housing and marketing the finished products. To these farmers, pig production is a business.

In the traditional free range/backyard/roaming systems, the amount of time allocated to pig-raising differs from region to region and homestead to homestead. Where pigs are kept in a fully free range way and left to scavenge, little or no time is allocated to their upkeep unless the farmer wants to sell the pig to meet an urgent need for money.

In the traditional free range system of Western Kenya and Nyanza, pigs will be given some feed, morning and evening. In most cases this is not adequate and the pig will have to scavenge (if free) or eat grass if tethered. No attention is given to the pigs at other times, so in this sense, inadequate time is allocated to the pigs' upkeep. Where sows farrow in the bush with no special attention, piglet mortality ranges from 50 to 80 percent. More time is allocated to their upkeep when the piglets are weaned for sale or the finished pigs are being sold to pig traders.

Farmers who buy weaned piglets allocate some time to care for them as they are delicate. Although it is common to find pigs tethered in the hot sun all day with no provision of water, equally in some homesteads, pigs are treasured and given a lot of attention. Such owners are proud of their clean, well-fed pigs, keep records of breeding and sales and, in most cases, receive a higher price for their efforts.

5.3 CONTRIBUTION TO HOUSEHOLD INCOME / FAMILY ECONOMICS

In all production types, pig-keeping plays an important role in household income. The pig's short breeding cycle leads many farmers to take the view that smallholder pig- keeping is the livestock equivalent to cash crops and has potential to improve rural livelihoods.

In the traditional free range system, the sale of piglets or finished pig provides money needed to pay school fees and hospital bills, buy clothes and food, and build better houses. The pig acts as the farmers' bank. Improved marketing through forming farmer groups such as KENPFA, providing access to credit, and equipping farmers with basic knowledge about pig farming present opportunities for profitable pig production under this system.

In the commercial system, pig production plays a major role as farmers keep the pigs wholly for income-generation. The profits are used to meet other expenses in the homestead, including business development and investment. Improvement in the sector is desired and possible. One of the major constraints singled out by commercial farmers is the erratic market. Sometimes the pigs are ready for market but the market is not ready to receive the pigs. Investment in value-added processing facilities in rural areas would offer alternative outlets for the finished pig.

Consumer education to counter traditional attitudes would help to broaden the market for pork and pork products. Farmer's Choice produces products which are affordable even by those on low incomes.

5.4 GENDER ASPECTS

In the free range pig production systems of Western Kenya and Nyanza, where men are rarely at home, women play an important role in the management of pigs although men take charge of selling the family pig and deciding how the family will use the proceeds. It is said that women care for the pigs and men sell the pigs, reflecting the cultural expectation that men are the decision-makers in most rural families. However investment in the pig sector in this region should involve women as they play a major role.

Women also play a major role in the small-scale commercial system in Central Kenya. They feed the pigs and are responsible for gathering and applying farmyard manure. As in the traditional free range system, men sell the pigs and control how the money is used. The pig traders approach the men rather than the women who have no say in pig sales. In most cases the men buy a replacement pregnant gilt, weaner or a young boar in the expectation that the women continue to raise whatever livestock is around.

Chapter 6

Breeds

6.1 EXOTIC BREEDS

Breeding animals are difficult to get because there are few breeding farms. Those that exist sell breeding stock at high prices. For instance, Farmer's Choice and a few established breeders sell pregnant sow for US$ 200–250, Boar for US$ 225–275[5].

Popular breeds include Large White, Landrace and their crosses. A few Duroc are also available - used as terminal sires by Farmer's Choice Ltd. in their three-way cross-breeding scheme, resulting in improved growth rates and carcass quality. The Large White is robust, adaptable and high-performing, and is preferred by most pig farmers. Farmer's Choice is the only company that has pure bred Large White sows. These are kept at Uplands Farm (Rose Mark Limited) and supply offspring to be used in cross-breeding at their other farms. The Duroc–Jersey has good attributes for rearing and growing in the tropics and is widely used for cross-breeding with the Large White. Landrace pigs have been widely used for cross-breeding in the tropics. They do well under close confinement, requiring higher management and feeding levels.

The KARI pig breeding station at Naivasha, which suspended its activities in 2008 because of the lack of market, had been a source of exotic breeds for farmers since its inception in 1953. If KARI were to reverse this decision, activities at the station could still resume and the importation of pure breeds could recommence – but at present there is no indication that this is under consideration. The Agricultural Development Corporation (ADC) was also involved in exotic pig breeding at their Malindi farm, Nakuru and at Uplands (which it pulled out of in 1987).

Other farms keep mainly Large White and Landrace crosses. These are sourced from Farmer's Choice, large commercial farms, Catholic missions and other small-scale breeders, and are the major sources of exotic breeding material for Kenyan pig farmers. Exotic crosses are also common among the free range/scavenging/roaming pig enterprises found in slum areas in major towns and cities in Kenya, and can be found in garbage dump sites, waste disposal pits and sewer disposal channels. Exotic cross-breeds are preferred by the market. Skin colour other than white attracts a penalty at most major slaughter facilities, especially if the colour is black.

PICTURE 23: **Large White pig at the Veterinary Farm – University of Nairobi**

PICTURE 24: **Pigs from the areas surrounding Ndumboini slaughter house waiting to be slaughtered**

[5] Exchange rate, October 2010: US$ 1 = Ksh 80

6.2 LOCAL BREEDS

Most pigs in the country are highly inbred and there is an urgent need to address this challenge.

It is not known whether there are any local breeds in Kenya. Most experts agree that pigs in the free range systems are the result of extensive inbreeding between exotic cross-breeds and other types of cross-breed from neighbouring countries, especially Uganda. These inbred pigs have adapted to the environment and feeding regimes in the free range system, giving rise to the multi-coloured pigs seen tethered or scavenging in places where this system is practiced. Examples of these breeds are shown in the photos below.

PICTURE 25: **Varieties of pigs kept by the farmers in Busia County: a. white boar, b. black and white sow, c. black boar, d. black and white grower (Kagira et al. 2010)**

There are no organized breeding programmes. A boar is shared among several farmers and inbreeding is very common. A farmer buys a male and female weaner piglet from the same litter which becomes his starter stock.

Neighbours share boars and there is no support for the boar keeper. The owner can sell the boar anytime he needs money.

The pigs have a variety of skin colours, are small in size and take a long time to mature. Sows farrow once a year. Mature gilts and baconers are sold at two years of age, most of them underweight at between 50 and 70 kg live weight. Piglet mortality is between 50 and 60 percent owing to starvation and disease endemic to the harsh environment.

These breeds nevertheless play a significant role in these areas, contributing to the livelihood of the homesteads and supplying pigs to the local butcheries. Some of these pigs are transported to an abattoir on the outskirts of Nairobi and so end up being consumed in the capital. Upcoming pig processors also buy the carcasses of these breeds from this particular slaughter facility for use in their various processed pork products.

Chapter 7

Wildlife

7.1 WILDLIFE POPULATION (SUIDAE / TAYASSUIDAE)

Giant forest hog and river hogs, whose population has not been estimated, are found in Western Kenya and parts of Nyanza. They are seen only at night when they raid farms, uprooting cassava, sweet potatoes and coco yams. Warthogs and bush pigs are widespread in most forested areas of Kenya. It is common to see warthogs grazing along the roads in these areas especially during the dry season.

7.2 HUNTING / CONSUMPTION

In Kenya, it is illegal to hunt wild animals but people hunt warthogs and bush pig for meat. Poaching is common in areas where these animals are found.

Trichinellosis was previously reported in Kenya in 1960s and 1970s. Two cases were reported in 1995 from people who had eaten warthog/wild boar. A more recent case of trichinellosis in a Japanese tourist to Kenya who had eaten wild meat (including alligator, pig, zebra and ostrich) indicated that the disease could still be circulating amongst the wild animals in the country, and possibly in domestic free range pigs.

7.3 INTERACTION WITH DOMESTIC PIGS

Research conducted by ILRI around Ruma National Park in Homabay shows that domestic pigs in the free range system in Nyanza and Western Kenya interact with these giant forest hogs, river hogs, warthogs and bush pigs, especially if the domestic pigs are roaming at night.

Wild pigs are also found around Ngong, Thika and Machakos. Wild pigs are important reservoirs of African swine fever (ASF). High titers against ASF virus have been found in free range domestic pigs in these areas (Okoth, personal communication). There is also the possibility of offal from hunted wild pig being used to feed domestic pigs.

Chapter 8

Animal, public and environmental health

8.1. MAJOR PIG DISEASES REPORTED / PRESENT

African swine fever (ASF)

The literature available indicates that the first case of ASF occurred in 1905 among imported pigs. However, this viral disease was first diagnosed among pigs in 1954. It affected Kiambu county in 1958 and Trans Nzoia in 1964. The disease re-emerged in 1994 where it affected Kiambu, Thika, Nairobi and Kajiado. Outbreaks were reported in Kiambu, Thika and Nairobi in 2001 and the last outbreak occurred in 2006/2007 affecting Kiambu, Thika, Nairobi, Nakuru, Eldoret, Kisumu and Busia Districts.

Contact between wild pigs and domestic pigs is one cause of ASF outbreaks. The virus is also transmitted by the soft tick Ornithodorus *moubata.* The recent outbreak in Kenya was traced to have originated in Busia and spread to all the other districts through pork and pork products.

The outbreak of 2006/2007 wiped out most of the free range scavenging pigs in Nakuru, Eldoret and Kisumu garbage dump sites. Numbers are slowly building up again. A recent study has shown that 20 to 25 percent of pigs in the traditional free range systems have antibodies against African swine fever (Okoth, unpublished).

Influenza A

So far, pigs in Kenya have tested negative for pandemic influenza H1N1 (2009). However, serum samples and swabs from an abattoir which receives pigs from several parts of the country, including free range backyard pigs from Nairobi, showed (using PCR and ELISA methods) evidence of infection with influenza A viruses. Subtyping of the influenza virus isolated is being carried out. 1 200 cases of influenza H1N1 (2009) have been confirmed in humans using PCR and ELISA diagnostic techniques (Munyua, CDC-Kenya, personal communication). Although pigs in Homabay and Nakuru tested negative for pandemic H1N1, the provincial administration ordered the killing of all free range scavenging pigs.

The DVS also conducted a survey of influenza A viruses in pigs in Nairobi and Thika, through the Department of Veterinary Services. Subtyping of the influenza viruses isolated is being carried out.

Porcine cysticercosis

Porcine cysticercosis is the infection of pigs by larval stages of the human tapeworm *Taenia solium*. The tapeworm sheds eggs in faeces which are picked up by pigs, in areas where they are allowed to roam and scavenge, particularly where the human population does not use latrines. The eggs hatch in the stomach of the pig and are distributed by the blood system to various muscles and organs. Here they develop into a larval stage called cysticercus cellulosae. Free range pigs are slaughtered when they are over a year old and this is enough time for the cyst to develop. Humans get infected by eating raw or undercooked pork, allowing the larvae to reach human intestines and there develop into an adult tapeworm that starts laying eggs.

Cysticercus cellulosae is zoonotic, meaning that it is a disease that can be transmitted between animals and humans. Poor hygiene and sanitation may lead to humans ingesting the eggs of the *Taenia* solium. The larval stages lodge in various organs and lead to blindness. When they lodge in the brain they lead to a condition called Neurocysticercosis (NCC) which is a major cause of acquired epilepsy and can be fatal.

The prevalence of porcine cysticercosis, using lingual palpation, among traditional free range pigs has been estimated at between 10 and 14 percent in Busia, 5 to 9 percent in Teso and 6 percent in Homabay District. Seroprevalence of porcine cysticercosis in pigs in Busia District using ELISA has been found to be between 4 and 20 percent.

National prevalence of porcine cysticercosis at meat inspection is less than 0.02 percent. This has been attributed to poor recording and reporting at the MOLD headquarters. At Farmer's Choice, cases of cysticercus cellulosae have been recorded since July 2002. These involved single carcasses that were condemned. Porcine cysticercosis causes losses - owing to condemnation of carcasses and trade restrictions as major markets shy away from regions which have reported cases of porcine cysticercosis.

Other Diseases

Other diseases reported include helminthes, mainly the gastrointestinal *Ascaris suum* and Oesophagostumum species. Free range pigs have been found to show milky spots caused by the migratory stages of *Ascaris suum* and to be heavily infected by the lung worm Metastrongylus. Pigs have also been found to be infected with various gastrointestinal protozoa such as Coccidia, Balantidium spp, Tritrichomonas and Enteomoeba which are zoonotic. Five cases of Anthrax have been confirmed in pigs between December 2008 and June 2010 by the Disease Control Unit of the Department of Veterinary Services.

In the commercial production systems, pneumonia, meningitis and diarrhoea have been reported. Mastitis has been reported in sows. Gut edema has also been reported in Eldoret in the Rift Valley Province and Kikuyu in Central Province.

Farmer's Choice Limited has a vaccination regime for all its pigs against Erysipelas, E. coli, Porcine Parvovirus and Clostridium.

Mange, Pediculosis and tick infections are common among the free range systems. Jiggers (Tunga penetrans) also affect the pigs especially in Busia County. Mange has also been reported in some commercial farms in Central Province.

Commercial farmers in Central Province deworm their pigs monthly and this leads to development of anthelmintic resistance.

Foot and mouth disease (FMD) in pigs has been reported in parts of Central Kenya in 2009 in commercial enterprises which combine pig- and cattle-keeping. This followed outbreaks of FMD in cattle. The resulting ban on the transportation of live pigs and pig products from the affected farms had a major impact on the Kabati abattoir located in the area. The ban was lifted in early 2010.

Other conditions include lameness, tether wounds on the feet and necks of tethered free range pigs, and trauma from various objects.



PICTURE 26/27/28: **Tether wounds on the neck and forelegs of free range pigs in Nyanza**

PICTURE 29: **Heavy pediculosis in a 5 week old free range piglet**

PICTURE 30: **Cysticercus cellulosae cyst under the tongue of a free range pig in Homabay County**

8.2 PUBLIC HEALTH / SANITATION

In 2008, 32 percent of the rural population were using improved sanitation facilities, while 18 percent were using the open defecation system without latrines (Source: WHO and UNICEF Joint Monitoring Program (JMP)). In areas where sanitation is poor, human beings do not use latrines and pigs are allowed to roam freely, the risk of transmission and maintenance of zoonotic pathogens is very high.

8.3 BIOSECURITY

Bioexclusion is the responsibility of pig farmers. The objective is to exclude any virus or parasite coming onto the farm, by maintaining cleanliness and being very sure of the provenance of pigs. It is essential that any pig entering a farm or joining a herd meets legal and sanitary requirements. In Kenya, levels of hygiene and biosecurity vary according to the production system. At one extreme is the free range backyard system where hygiene is poor.

In the small-scale commercial system, biosecurity and hygiene standards are higher in establishments where pigs are housed on concrete floors. These are washed daily and the pigs provided with clean water. A challenge in this system is disposing of manure - done at the roadside in some enterprises. In those establishments where the floors are not concrete, hygiene is poor with pigs rooting in the muddy waters and soil.

In the large commercial systems, hygiene standards are good and resources are allocated to maintaining these standards.

According to several bylaws, no animals should be kept in urban areas. Those keeping animals should have a special license. In rural areas, a farmer who plans to keep pigs is expected to build a house and put in place other infrastructure as outlined in the Animal Diseases Act (Control of Pig Diseases). The procedure is then to apply for a license to keep pigs by paying US$ 2.5 to any livestock office, following which a veterinary officer will inspect the premises. If the requirements are met, the farmer pays US$ 5 and is issued with a one year license, to be renewed annually. The Act obliges farmers to maintain a clean environment free from parasites, vermin and other contaminants, and covers the following four main areas (Department of Veterinary Services - Kabete):

Import control

The Department of Veterinary Services regulates the importation of pigs and pig products under the Animal Diseases Act (Animal Diseases Rules 1-14). Personnel stationed at all ports of entry into the country verify the import specifications once the import is approved by the DVS.

Local movements of pigs

To regulate the risk posed by local movement of pigs, animals require health certification before being issued with a Movement Permit by a DVO.

Feed Control

Cap 345 of the Act provides for standardization and sanitary management of animal feeds. Manufacturers are expected to produce feeds to the nutritional standards identified in the Act. The Act also requires that animal proteins be sterilized at specified temperatures to kill all the pathogens, before they are fed to animals. Sterilization plants are licensed by the Department of Veterinary Services.

Monitoring compliance with the requirements is the current challenge, with the inspection network lacking manpower.

Farm biosecurity

All piggeries are licensed by the Department of Veterinary Services. Licenses are issued according to the Animal Diseases Act (Control of Pig Diseases Rules), and specify the architectural design of the piggery including size, area, materials to be used, and rodent-proofing. The Act also requires that pig manure be composted for one month before being released for crop and fodder use. The pig farmer has the following obligations:

- Report all notifiable diseases to a government veterinary officer;
- Isolate sick pigs from the healthy ones;
- Accommodate the pigs in approved housing;
- Uphold pig welfare as stated in Cap 360, i.e. maintain a clean environment free from parasites, vermin and contaminants; feed the swine adequately; always provide clean water; and call a qualified veterinary surgeon to attend to them when they are sick.

These biosecurity laws are only adhered to in commercial enterprises. Small-scale farmers apply them if and when the market demands. The main challenge in the latter sector is the disposal of manure, procedures for which are absent in free range backyard systems and traditional free range systems.

8.4 ENVIRONMENTAL IMPACTS

In the free range production systems, pigs degrade the land by destroying crops, and pollute the water sources as they go to marshy areas to wallow in mud.

Pigs kept in the backyard/scavenging systems destroy and block sewer drainage tunnels. They expose human being to various infections and health hazards. Feeding and rooting in garbage and waste disposal sites disturbs and destroys these areas. The pigs are a huge nuisance to the municipal and city authorities, and a major challenge to environmental management agencies, public health authorities, provincial administrations and the surrounding neighbourhoods.

According to the Environmental Management Act 2008, it is illegal to keep animals in the municipalities. Pigs kept under these conditions are an environmental hazard and a nuisance - leading to water, air and noise pollution.

Manure and waste disposal is a major challenge in small- and large-scale commercial systems, especially so on farms where crops are not grown, and in urban areas. On mixed farms where livestock and crops are raised, the animal manure is used on crops after the composting for one month required by law. Where there is no arable element to the farming enterprise, manure accumulates and leads to air pollution. Some farms dispose of this manure along the roadside and on uncultivated land, or into sewage and storm water drainage channels in urban areas. The manure is washed into the water sources by rain and storm water, leading to water pollution. Those neighbouring such livestock farms are unhappy with the enterprises, maintaining the attitude that pigs are dirty animals and complaining to the authorities.

Manure and waste disposal is also a challenge for small slaughter houses and slabs with no effluent treatment facilities - leading to water and air pollution. Major abattoirs have effluent treatment plants and the resulting sludge and compost is either sold, or given to farmers for growing fodder such as Napier grass.

Chapter 9

Policy and legal framework affecting the pig industry

Kenya Vision 2030

This national government policy is the economic blueprint for development up to 2030. The vision identifies seven pillars of the national economy. Chapter 4 identifies six sectors, including agriculture, as key drivers of growth. The agricultural sector is projected to contribute additional benefits to the economy worth between Ksh 80 and 90 billion.

Agricultural Sector Development Strategy (ASDS)

Formerly known as the Strategy for Revitalization of Agriculture (SRA), this policy institutionalizes Kenya Vision 2030 in the ministries relating to the agricultural sector. The technical part of the review is complete and the policy awaits ratification, printing and re-launching.

National Livestock Policy

The Sessional Paper for National Livestock Policy was approved in December 2008 and is in print. With respect to disease control, this policy enables the Government to:

- Enhance control of notifiable diseases, including farmer compensation where stamping out programmes are enacted [Section 3.4.1];
- Make available the necessary material and human resources for disease control [Sections 3.4.1, 3.4.6, 2.4.12 and 3.9.10];
- Provide a rapid response to check the effects of disease outbreaks [Section 3.4.10];
- Develop and rehabilitate the livestock marketing infrastructure in collaboration with relevant stakeholders, including identifying and attracting the necessary support for infrastructure development [Sections 3.6.3 and 3.6.13];
- Facilitate the enforcement of Sanitary and Phytosanitary Standards (SPS) as per the WTO Agreements of which Kenya is a signatory, including developing and enforcing good practices which conform to national and international standards at all stages of production and marketing.
- Install the necessary animal production and processing mechanisms acceptable to regional and international markets in line with WTO agreements.

Animal Diseases Act

As Chapter 364 in the laws of Kenya, this Act empowers the Minister and the Director of Veterinary Services to effectively manage animal diseases by:

- Declaring the range of animals and diseases addressed by the law [Section 2];
- Gazetting diseases as notifiable [Section 2];
- Enforcing the reporting and notification of diseases [Section 4];
- Providing and enforcing measures for managing disease outbreaks [Sections 5-7];
- Destroying infected animals and compensating producers when livestock are culled for disease-control purposes [Sections 10–13];
- Regulating imports of animals, formites and biological products [Section 8, Rules 3–14];
- Regulating movement of animals from place to place [Section 9 and Rules 15–28];
- Enforcing mass vaccination and treatment of animals [Section 9 and Rules 38–39];
- Providing and enforcing animal health inspectorate [Section 14, Rules 17–19];
- Providing for the creation and enforcement of disease barriers [Section 9, Rule 35];
- Authorizing drugs and vaccines which may be used in the country [Section 15];
- Providing quarantine facilities and quarantine restrictions [Section 9, Rules 31–33];

- Enforcing the disinfection of infected premises, contaminated persons and formites as well as the disposal of cadavers [Section 9, Rules 43, 45–47];
- Empowering the Director or Veterinary Officers to take any measure considered necessary or advisable in order to prevent the spread of disease [Section 9, Rule 30].

Uplands Bacon Factory Act

- Chapter 362 of the laws of Kenya addresses the regulation and operation of the pig industry under the Pig Industry Act Cap 361 [Section 3].
- Meat Control Act
- Chapter 356 of the laws of Kenya addresses the regulation of abattoirs, the meat inspection code, and the transportation of meat.
- Fertilizer and Animal Foodstuffs Act
- Chapter 345 of the laws of Kenya provides for sanitary controls of fertilizers of animal origin and animal feedstuffs.
- Food, Drugs and Chemical Substances Act
- Chapter 245 of the laws of Kenya regulates standards for foodstuffs, drugs and other chemical substances in the food value chain.
- Pharmacy and Poisons Act
- Chapter 244 of the laws of Kenya provides for the regulation of veterinary and human medicines.
- Veterinary Surgeons Act
- Chapter 366 of the laws of Kenya provides for the regulation of animal health providers.
- Pest Control Products Act
- Chapter 364 of the laws of Kenya provides for the regulation of animal and plant pest control products.
- Branding of Stock Act
- Chapter 357 of the laws of Kenya provides for animal identification and traceability using marks on the skin of animals.
- Prevention of Cruelty to Animals Act
- Chapter 360 of the laws of Kenya provides for animal welfare protection measures.
- Standards Act
- Chapter 496 of the laws of Kenya regulates product and process standards.
- Crop Production and Livestock Act
- Chapter 321 of the laws of Kenya provides for the regulation of animal breeding and stocking rates.

Chapter 10

Analysis

10.1 CURRENT STRENGTHS AND WEAKNESSES OF THE PIG SECTOR

Opportunities

- Increasing numbers of people are interested in consuming pork and the market base is consequently expanding.
- The price of other meats is rising compared with pork, and a recent campaign has encouraged people to increase their consumption of poultry, rabbit and pork products.
- An increase in the number of outlets, such as local butcheries and small-scale processors, means that farmers have a wider choice of market for their product.
- As farm sizes continue to decrease owing to high human population and fragmentation of land, land-intensive livestock such as pigs gain advantage over livestock that require more land such as cattle.
- Farmers can enhance their profit margins by making their own feeds; the potential to reduce production costs makes pig-rearing even more viable.
- Export markets for pork products already exist, increasing the market base.
- The short production cycle for pigs gives them an advantage over other livestock such as cattle.
- The formation of pig farmers' interest groups has been championing the interests of pig farmers.

Major constraints in the pig industry

Marketing limitations cut across the country but the major ones are:

- Low prices: Demand for pork products determines the number of pigs bought. The largest buyer is Farmer's Choice and they cannot buy all the pigs produced. Farmers otherwise sell to local butcheries; with the selling price dictated to some extent by the fact that further maintenance of the pigs on the farm is costly. The prices offered by local butcheries can still be higher than those offered by Farmer's Choice, though. The growing popularity of pork has begun to alter this imbalance between producers and buyers in the market, making it possible for alternative outlets such as Chef's Choice to get established and compete with Farmer's Choice.
- Lack of slaughter facilities: This is a problem in some regions, requiring pigs to be transported over long distances and resulting in further marketing issues.
- Infertility and related problems: These are because of inbreeding and underfeeding, the root cause of which is poor management.
- Unavailability of or high prices for breeding stock: This causes inbreeding in some areas when farmers cannot get hold of or afford quality breeding stock.
- Inadequate or non-existent credit facilities: Not all farmers who need and want credit get it.
- Poor husbandry: Fewer than 50 percent of all pig farmers in Kenya practice modern pig farming with proper housing, feeding and healthcare procedures, which impacts on production levels.
- Outbreaks of disease: African swine fever, for instance, causes great losses to the pig industry.

Strategies

- Improve quality of pig breeds-
- Import quality breeding pigs
- Revive pig breeding station at KARI Naivasha.
- Include pig farming in the National Livestock Policy.
- Improve access to extension services and training-

- Intensify training to farmers and staff relating to public health and sanitation
- Increase extension workers' mobility.
- Create incentives for pig production-
- Improve access to short- and long-term credit for pig producers and pork processors
- Task the Kenyan Bureau of Standards (KEBS) with controlling and monitoring industrial feed production to ensure good and constant quality.
- Encourage pig farmers to form interest groups to improve bargaining power.
- Increase demand for pork through focused communications-
- Popularize pork consumption in ASK shows, field days and demonstrations.

10.2 PROSPECTS OF THE PIG SECTOR OVER THE NEXT FIVE YEARS

There is continued demand for pork as the tourism industry has continued to grow. Many farmers who had stopped rearing pigs are now recommencing pig-keeping and contributing to an increased output of pork. Another factor in the increased demand for pork is its growing consumption by local people, being that it is cheaper than beef in some regions.

Farmer's Choice handles about 80 percent of the pigs processed in Kenya. Recently the factory issued a circular to farmers, through the office of the production manager, to scale up production as demand for pork rises, and FC projects that this growth in demand will continue to rise. Small processing firms (such as Oscar Foods –Kikuyu, Chef's Choice and Hurlingham Butcheries) have since proliferated in order to process pork at various levels in Kenya's major towns.

Pork barbeque eateries have sprung up in towns such as Thika, Nyeri, Kerugoya, Kakamega, Busia and Eldoret, greatly increasing the market for pork. In most of these urban areas, the demand is higher than the supply.

Pig producers in Central, Nairobi and Eastern Provinces continue to enjoy the ready market offered by Farmer's Choice and other small processors such as Oscar Foods. As pork consumption patterns change from it being the preserve of tourists and the rich to being eaten more generally, numerous local butcheries in urban centres in these areas have begun to thrive.

Pigs are particularly suitable in high-potential smallholdings since they need less land compared with other livestock. High human population and a corresponding reduction in farm size have made it necessary to maximize use of land – enhancing the viability of pig farming.

The short reproductive cycle for pigs is favourable and farmers are able to take advantage of this if assured of market support and stability.

The recent registration and formation of the Kenya National Pig Farmers Association is a great step towards bringing pig farmers together to address the challenges in the sector. Such groups are able to access credit, cheaper feed sources and good markets; and lobby for government support for the sector. Such groups will also build regional slaughter houses and processing factories thereby improving the value of the pork.

Prospects for the pig sector over the next five years are promising.

10.3 POTENTIAL OF PIG PRODUCTION IN ACHIEVING MDGS

In September 2000 heads of state and governments met at the Millennium Summit and agreed on a set of eight goals, 18 targets and 48 indicators on development and poverty eradication.

These came to be known as the Millennium Development Goals (MDGs). They included a set of targets for development and poverty eradication mainly inspired by the International Development Goals (IDGS) or International Development Targets (IDTs).

The following MDGs were agreed upon:

- Eradicate extreme poverty and hunger
- Halve the proportion of people living on less than a dollar a day
- Halve the proportion of people who suffer from hunger
- Achieve universal primary education
- Ensure that boys and girls alike complete primary schooling
- Promote gender equality and empower women

- Eliminate gender disparity at all levels of education
- Reduce child mortality
- Reduce by two-thirds the under-five mortality rate
- Improve maternal health
- Reduce by half the maternal mortality rate
- Combat HIV/AIDS, malaria and other diseases
- Reverse the spread of HIV/AIDS
- Ensure environmental sustainability
- Integrate sustainable development into country policies and reverse loss of environmental resources.
- Halve the proportion of people without access to potable water.
- Significantly improve the lives of at least 100 million slum dwellers.
- Develop a global partnership for development
- Raise official development assistance
- Expand market access

Pig production has great potential to achieve several of these MDGs. Pig-keeping can eradicate extreme poverty as the reproductive cycle is short. One sow can farrow twice in one year.

The capital input into pig-keeping may be high but the returns are quick and good. With improving and new market opportunities, pig-keeping can eradicate extreme poverty and hunger. As reported in several areas, money from the sales of pigs is used to buy foodstuffs and commodities for households. Government can invest in improved pig production to eradicate extreme poverty.

Money from sale of pigs is also used for paying school fees and buying uniforms. Pig production can contribute to the achievement of the second MDGs – achieving universal primary education.

Pig production can also contribute to the third MDGs as women manage and feed the pigs. They can be empowered through initiatives and policies in pig production. Establishing these new principles and practices will contribute to the achievement of MDGs four and five. It is necessary to involve women more in the marketing of pigs to achieve these goals.

Improvement and promotion of pig production among the youth and other active group will provide employment and engagement thereby reducing the spread of HIV/AIDS. The formation of pig-keeping groups will also provide a forum for sharing experiences and strategies to reverse the spread of HIV/AIDS.

Pig production and marketing has the potential to contribute towards global development partnerships.

With improved and enhanced pig production, it will be necessary to expand domestic and foreign market access, thereby contributing to the eighth MDG.

Annex I

Who is who (contact list)

GOVERNMENT

Ministry of Livestock Development
Department of Veterinary Services
Department of Livestock Production
Ministry of Agriculture
Kenya Agricultural Research Institute - Naivasha
Ministry of Trade
Kenya Wildlife Service

RESEARCH INSTITUTIONS

International Livestock Research Institute
CDC-Kenya
University of Nairobi

PRIVATE COMPANIES (PRODUCTION, FEED, BREEDING, PROCESSING, MARKETING)

Farmer's Choice Limited
Unga Group Company Limited
King Feeds Limited
Ngae Feeds Limited
New Day Feeds Limited
Thika Pork Centre
Utugi Butchery –Nakuru
Mwangaza Limited - Homabay
Ndumboini Slaughter House
Lyntano Slaughter House
Kabati Slaughter house

FARMER ORGANIZATIONS

Kenya National Pig Farmers Association
P.O. Box 54250, 00200 Nairobi Kenya
Kenya National Fresh Produce Association

Annex II

List of major projects – pig sector

Currently there are no major development projects in the pig sector. Government and NGOs have in the past attempted to address issues of breeding, feeding and marketing. These have been frustrated by market fluctuations, and by the high cost and poor quality of feeds.

The last major government intervention was in 1996 with the ADB/GOK-sponsored pig project, which ended in the year 2000. The project was providing much needed credit and technical information in the pig industry. Unfortunately the effects were not felt due to other factors in the industry.

There are several projects addressing health issues coordinated by the Faculty of Veterinary Medicine at the University of Nairobi, and by Canada and International Livestock Research Institute (ILRI) at the University of Guelph. These projects are funded by the Wellcome Trust and the European Union through the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA). These include:

- Diagnostic and Control Tools and Strategies for *Taenia solium* Cysticercosis in Homabay
- Improving rural pig farming in Western Kenya
- Infectious Diseases of East African Livestock (IDEAL) – People, Animals and Zoonosis in Busia (Welcome Trust and ILRI)
- International Potato Institute (CIP) – Evaluation of Dry Matter Yields and Silage Quality of Sweet Potato Dual Purpose Varieties – Under Sweet Potato Animal Feed project – A component of SASHA (Sweet Potato Action for Security and Health in Africa).
- Survey of African Swine Fever (ASF) among domestic and wild pigs -ILRI – Kenya Wildlife Service (KWS) and MOLD.

Annex III

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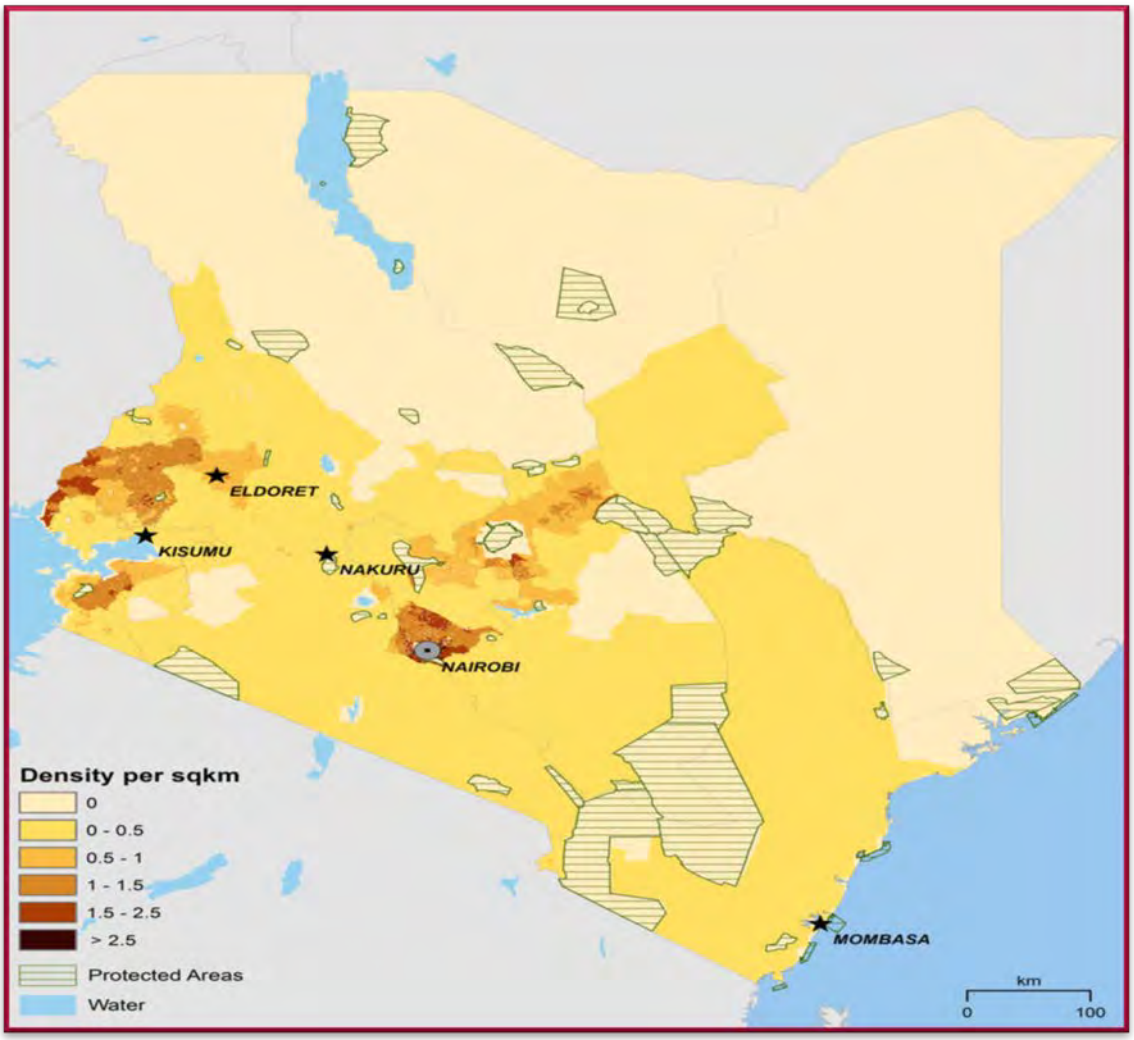
Annex IV

Maps

MAP 1: **Map of Kenya**

Source: http://www.lib.utexas.edu/maps/africa/kenya_pol88.jpg

MAP 2: **Modelled density of pigs in Kenya in 2005**

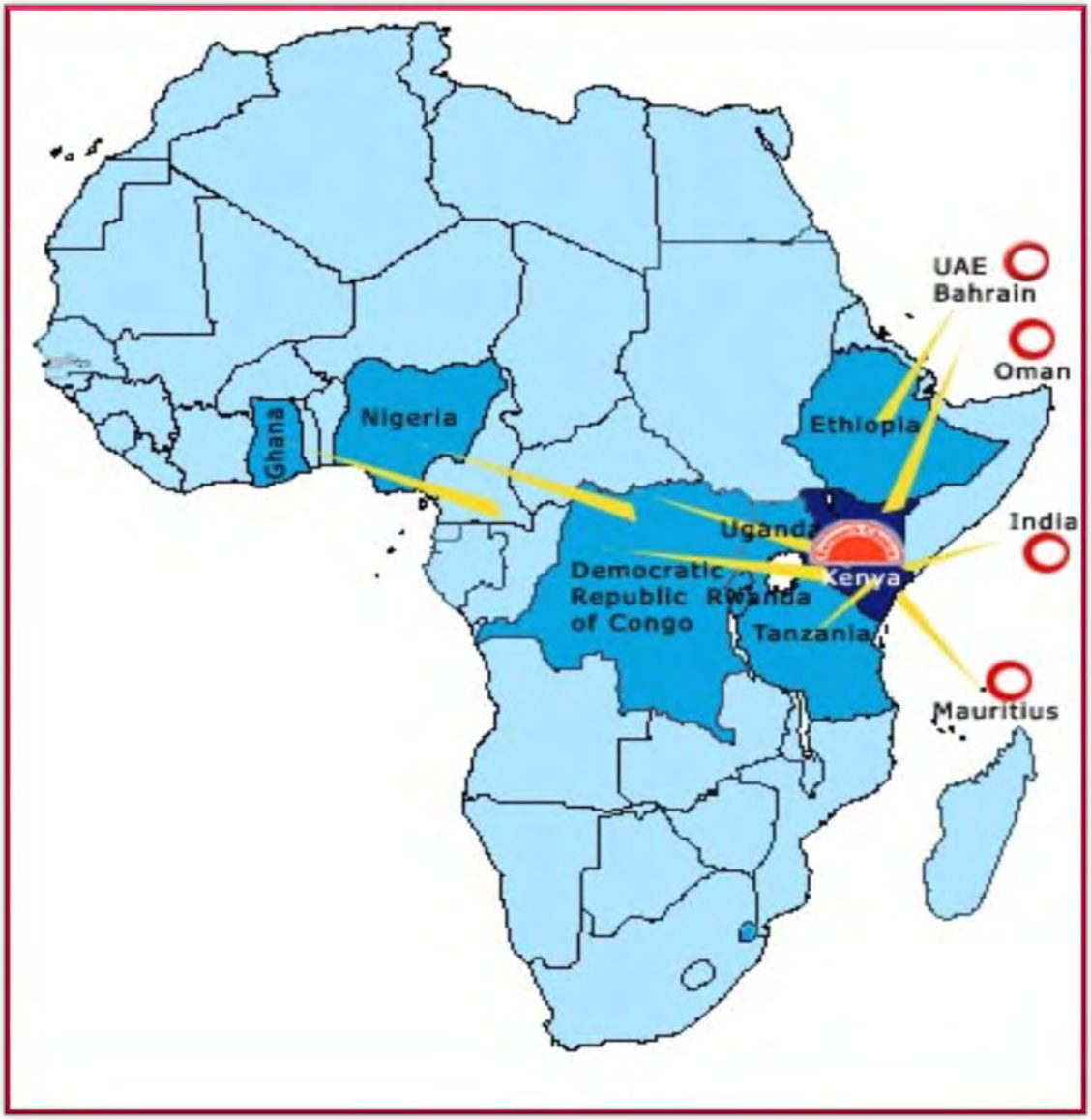


Source of original data: Ministry of Livestock Development, Kenya.

Model based on reported statistics at administrative level 3 (Division) for 2005, developed using the methodology described in FAO 2007[6] and adjusted to match FAOSTAT 2005 national total.

[6] FAO (2007) Gridded Livestock of the World, 2007, by G.R.W. Wint and T.P. Robinson. Rome: Food and Agriculture Organization (FAO) of the United Nations, Animal Production and Health Division.

MAP 3: **International distribution of pork and pork products by Farmer's Choice**



Source: www.farmerschoice.co.ke