

Poultry sector country review



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This review is based on the following report:
The structure, marketing and importance of the commercial and
village poultry industry: an analysis of the poultry sector in Kenya

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Foreword

The unprecedented widespread outbreaks of Highly Pathogenic Avian Influenza (HPAI) that occurred in many countries in Asia, Europe and Africa since 2003 have been asking for rapid and active response on a national, regional and international level. The HPAI crisis had to be addressed worldwide at the source, which is the poultry population.

The main danger of this disease, like others, lies in the way in which humans interact with and handle the production, distribution, processing and marketing of live poultry and poultry products. The direct and indirect socio-cultural and economic impacts of disease outbreaks influence policy measures and disturb markets, causing the loss of assets. There are strong negative impacts on the livelihoods of rural communities for all producer groups including small holders. Assessment and guidance on measures along the poultry chain for a safe poultry production is therefore of great importance. Specific consideration should be given to strategies and measures that ensure a sustainable pro poor supporting approach and development.

Better understanding of the specific situations of the different poultry sectors and the related market chains will help to develop appropriate disease control measures and improve biosecurity.

This review is part of a series of Country Reviews that are commissioned by the Animal Production Service (AGAP) of the Food and Agriculture Organization of the United Nations (FAO) for the Socio-Economics, Production & Biodiversity Unit of the Emergency Centre for Transboundary Animal Disease of FAO (ECTAD).

This review is intended as a resource document for those seeking information on the poultry sector at national level. It is not exhaustive. Some topics are only partially covered or not covered at all and the document will be supplemented and updated on an ongoing basis. Contributions and feedback are welcome by the author(s), FAO/AGAP and FAO/ECTAD Socio-Economics, Production & Biodiversity Unit¹.

The original report by Prof. Philip Nyaga was edited by Ms Jenny Schwarz in June 2008 and has been supplemented with data from the FAO statistical database (FAOSTAT), the World Bank and the United Nations Population Division.

¹ For more information visit the FAO website at: www.fao.org/avianflu/en/farmingsystems.html or contact either Philippe Ankers or Olaf Thieme, Animal Production Officers Email: Philippe.Ankers@fao.org and Olaf.Thieme@fao.org Food and Agriculture Organisation, Animal Health and Production, Viale delle Terme di Caracalla, 00153 Rome, Italy

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Acronyms and abbreviations

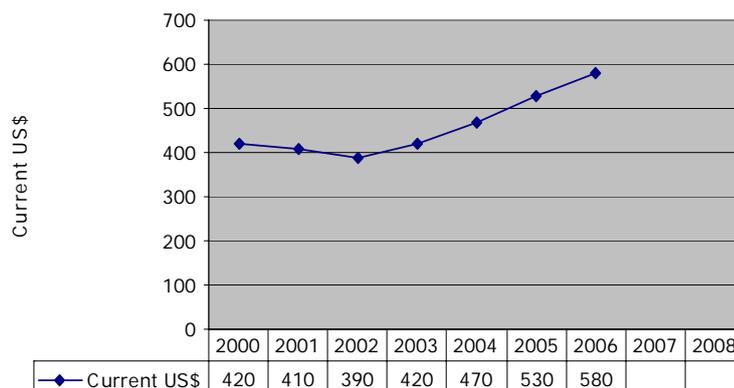
ABD	Agriculture Business Development
AI	Avian Influenza
ASAL	Arid and Semi Arid Lands
ASPS	Agriculture Sector Programme Support
ATCs	Agricultural Training Centres
BI Sh	Black Shavers
CM	Case Management subcommittee
DANIDA	Danish International Development Agency
DFID	Department for International Development
ES	Epidemiology and Surveillance subcommittees.
FAO	Food and Agriculture Organisation of the United Nations
FTC	Farmers' Training Centres
GDP	Gross domestic product
H5N1	Avian influenza of hemagglutinin subtype 5 and neuraminidase subtype 1
HPAI	Highly Pathogenic Avian Influenza
IEC	Information, Education, Communication and Social Mobilisation
IPC	Infection, Prevention and Control subcommittee
KAPP	Kenya Agricultural Productivity Project
KARI	Kenya Agricultural Research Institute
KEPOFA	Kenya Poultry Farmers Association
KWS	Kenya Wildlife Services
LR	Laboratory and Research Subcommittee
MALD	Ministry of Agriculture and Livestock Development
MLFD	Ministry of Livestock and Fisheries Development
MT	Metric tons
NALEP	National Agricultural Extension Programme
NPDP	National Poultry Development Programme
RIR	Rhode Island Red
SIDA	Swedish International Development Agency
USAID	United States Agency for International Development
WHO	World Health Organisation

Chapter 1

The country in brief

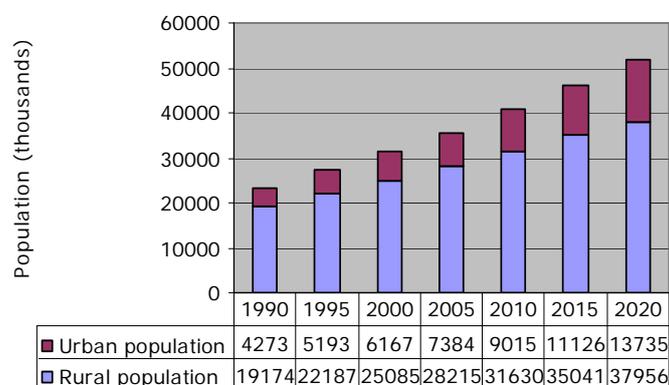
Country:	Kenya	
Location:	Eastern Africa, bordering the Indian Ocean, between Somalia and Tanzania	
Population, total	36,553,490 (2006)	Source: World Bank, May 2008
Population, growth rate:	3% (2006)	Source: World Bank, May 2008
Economy group:	Low income	Source: World Bank, May 2008

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



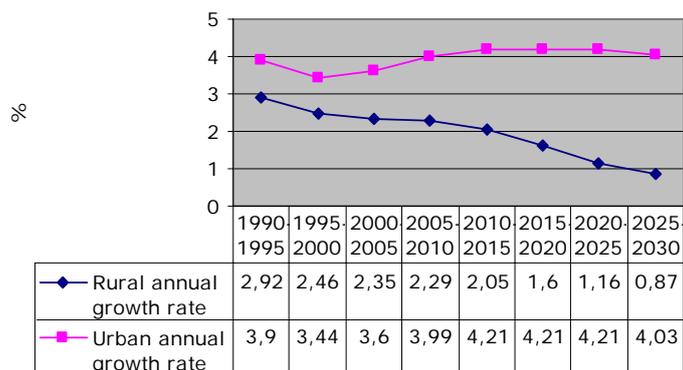
Source: The World Bank Group World Development Indicators, May 2008

FIGURE 2: Demographic profile



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision, <http://esa.un.org/unup>, May 2008

FIGURE 3: Annual population growth rates



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision, <http://esa.un.org/unup>, May 2008

Chapter 2

Profile of the poultry sector

2.1 NATIONAL POULTRY FLOCK

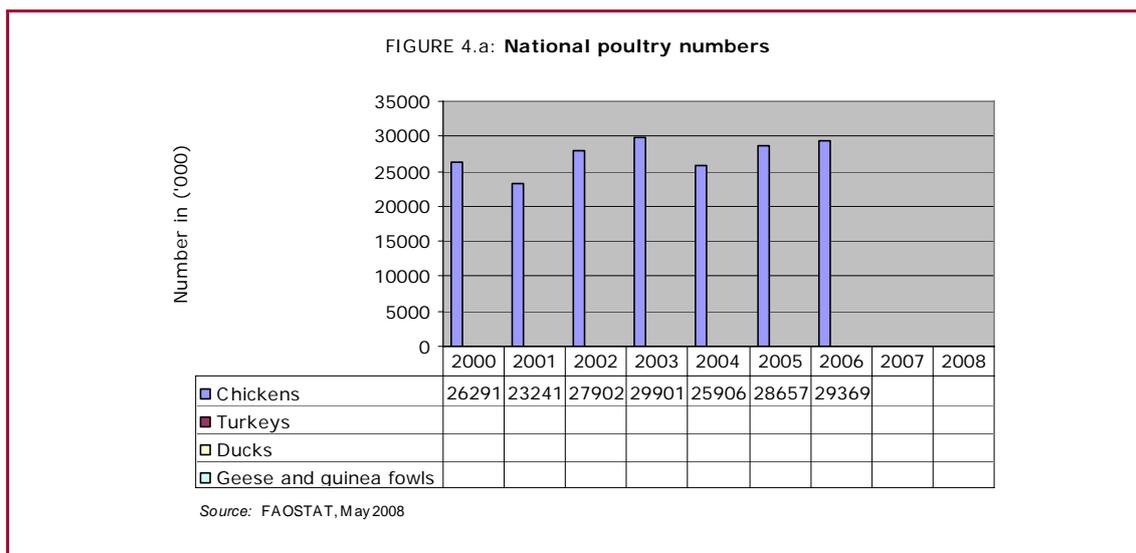
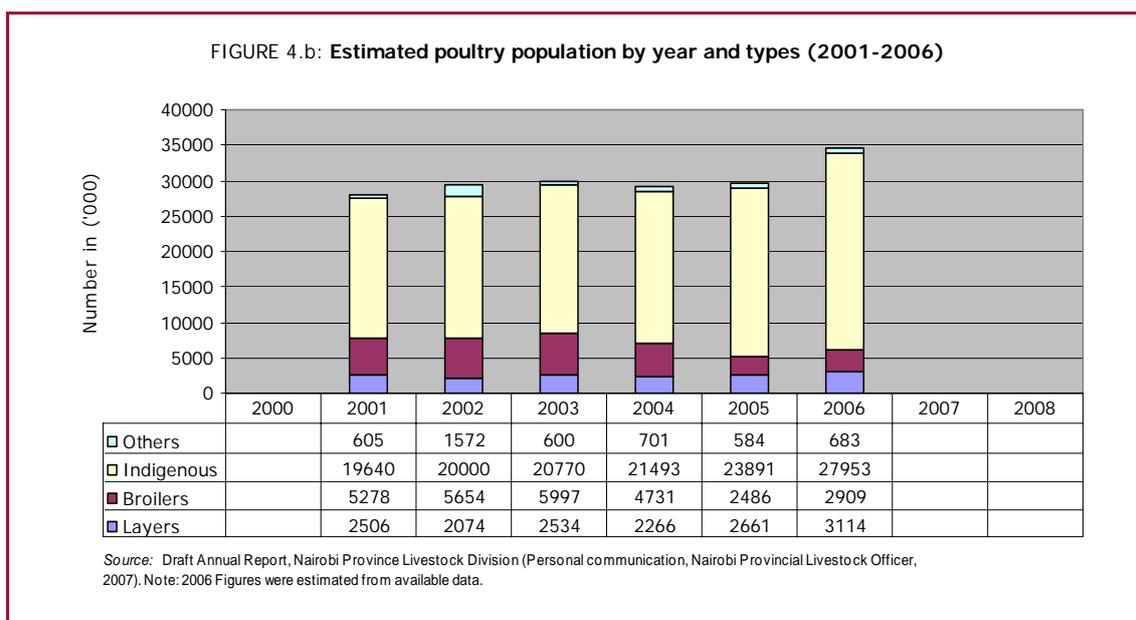


Figure 4.b shows the annual total poultry population in Kenya for the years 2001 to 2005 and the projections to the year 2006 for the different types of poultry. Although there seems to have been a decline in the number of broilers in year 2005, the overall trend shows an increase in the poultry populations over the five year period for both commercial and indigenous poultry.



2.2. GEOGRAPHICAL DISTRIBUTION OF POULTRY FLOCKS

For geographical information on Sectors 1 and 2, see Sections 3.2 and 3.3.

Table 1 shows the location of poultry farms in Sectors 3 and 4 in the various districts comprising the administrative provinces of Kenya. This table illustrates that most smallholder Sector 4 farms in Kenya are found in Machakos, Nakuru, Bungoma, Rachuonyo, Makueni, Mwingi, Kilifi and Kitui districts in decreasing order of numbers. The Arid and Semi Arid Lands districts of Mwingi, Kitui, Machakos, Makueni, Kwale and Kilifi are contiguous and between themselves carry the highest concentration of Sector 4 poultry in Kenya.

On the other hand, farmers in Kiambu, Thika, Nairobi, Nakuru, Kisumu and Machakos produce broilers in large numbers. In addition, commercial layer farmers are located in Thika, Kiambu, Maragua, Nakuru, Nairobi and Kilifi. All the high concentrations of commercial layer and broiler farmers are located near provincial urban centres and in the peri-urban areas of the city of Nairobi where access to markets is guaranteed.

TABLE 1:
Geographical distribution of poultry farms

location	Number of Units			
	Farms with parent stock	Broiler farms	Layers farms	Households with local breeds
	Exotic (Commercial)	Exotic (Commercial)	Exotic (Commercial)	Dual purpose Others
Rift Valley Province		555	711	55487 142
Nakuru		6	32	10453 6
Koibatek		4	35	22957 7
Keiyo		1	41	13973 8
U/Gishu		241	154	29953 31
T/Nzoia		38	377	34200 75
W/Pokot		0	18	30233 4
Laikipia		10	85	15233 17
Samburu		0	2	6760 0
Kericho		14	48	34773 10
Bomet		4	27	21200 5
Nandi North		18	61	205333 (?) 12
Nandi South		14	16	9678 3
Kajiado		206	188	11780 38
Narok		2	23	18533 5
Turkana		5	4	633 1
Marakwet		3	7	13420 1
T/Mara		0	3	14467 1
Buret		11	143	10191 27
Total		1132	1975	559257 393
Coast Province				
Malindi		158	75	33820 15
Taita		40	65	19550 13
Mombasa		321	267	1967 53
Lamu		5	13	9947 3

TABLE 1:
Geographical distribution of poultry farms

location	Number of Units			
	Farms with parent stock	Broiler farms	Layers farms	Households with local breeds
	Exotic (Commercial)	Exotic (Commercial)	Exotic (Commercial)	Dual purpose Others
Kwale		131	285	26100 57
Kilifi		370	382	36160 72
Tana River		5	1	3913
Total		1030	1088	131457 213
Western Province				
Vihiga		20	96	26136 20
Kakamega		30	88	26505 18
Bungoma		34	167	48793 33
Busia		2	37	19487 7
Teso		0	7	13984 1
Mt Elgon		0	3	8040 1
Malava/Lugali		2	55	24753 11
Butere/Mumia		0	70	9207 14
Total		88	523	176905 105
Nyanza Province				
Kisumu		458	184	19200 37
Siaya		2	29	26480 6
H/bay		0	33	29373 7
Kuria		2	29	9133 6
Migori		0	152	11000 30
Kisii		0	184	26673 39
Nyamira		0	105	23099 21
Rachuonyo		0	71	46404 14
Suba		0	21	6727 4
Bondo		27	26	13047 5

TABLE 1:
Geographical distribution of poultry farms

location	Number of Units			
	Farms with parent stock	Broiler farms	Layers farms	Households with local breeds
	Exotic (Commercial)	Exotic (Commercial)	Exotic (Commercial)	Dual purpose Others
Nyando		150	120	20400 24
Gucha		0	118	20540 24
Total		639	1072	252076 217
Central Province				
Nyeri		45	196	20003 39
Kirinyaga		32	115	25856 23
Nyandarua		22	109	20867 22
Muranga		76	184	6867 37
Maragua		40	767	11199 153
Thika		5184	2346	17827 469
Kiambu		5351	1185	12633 237
Total		10750	4902	115252 980
Eastern Province				
Embu		46	65	5553 13
Mbeere		0	44	11940 9
Meru South		13	36	4953 7
Meru North		14	75	14667 15
Meru Central		0	99	9327 20
Tharaka		484	4	13727 1
Machakos		0	413	62407 83
Makueni		0	0	44560
Kitui			15	34713 3
Mwingi		1	3	41900 1
Isiolo		0	28	2867 6
Marsabit		0	1	8667 0

TABLE 1:
Geographical distribution of poultry farms

location	Number of Units				
	Farms with parent stock	Broiler farms	Layers farms	Households with local breeds	
	Exotic (Commercial)	Exotic (Commercial)	Exotic (Commercial)	Dual purpose Others	
Moyale		0	0	0	0
Total		558	783	255281	158
North Eastern Province					
Garissa		0	0	2333	0
Mandera		0	6	3000	1
Wajir		0	0	1687	0
Ijara		0	0	2473	0
Total		0	6	9493	1
Nairobi		9464	962	7833	192
TOTAL		23661	11311	1507554	2259

Poultry population in the capital city of Nairobi and its environs

Nairobi city is the final destination for poultry from the rest of the country and hence has the oldest slaughter facilities, particularly for indigenous birds. Nairobi is also the major entry point for poultry coming into the country and a transit point for poultry destined for neighbouring countries. Nairobi also has its own poultry population for farmers keeping birds in the urban and peri-urban areas (Table 2). It can be clearly seen from this table that poultry populations declined sharply in 2006 in all divisions of Nairobi. This is the period when there was an avian influenza scare in the country which started in October of 2005 and did not abate until mid-2006.

**TABLE 2:
Population of all poultry by administrative divisions in the city of Nairobi (2001-2006)**

Division	Year					
	2001	2002	2003	2004	2005	2006
Kasarani	59,874	132,127	89,223	75,938	721,195	122,475
Dagoretti	16,900	34,770	57,180	56,450	77,286	76,755
Langata	146,180	146,180	388,237	422,871	366,808	129,983
Makadara	7,000	5,665	5,620	9,356	10,360	14,645
Embakasi	89,020	16,824	295,385	416,700	418,750	398,930
Westlands	19,251	24,390	26,096	25,840	25,834	15,085
Total	338,225	359,956	861,741	1,007,149	1,620,233	759,417

Source: Draft Annual Report, Nairobi Province Livestock Division, (personal communication, Nairobi Provincial Livestock Officer, 2007)

Table 3 shows that the decline was very drastic for broilers and turkeys and much less for layers. On the other hand, there was a slight increase in the number of indigenous poultry from year 2005 to year 2006. This may be explained in that these birds scavenged for food and were kept in city homes for home consumption whereas broilers and layers kept for commercial purposes needed expensive commercial feeds to keep them alive and marketing became a problem in the face of an avian influenza disease outbreak scare.

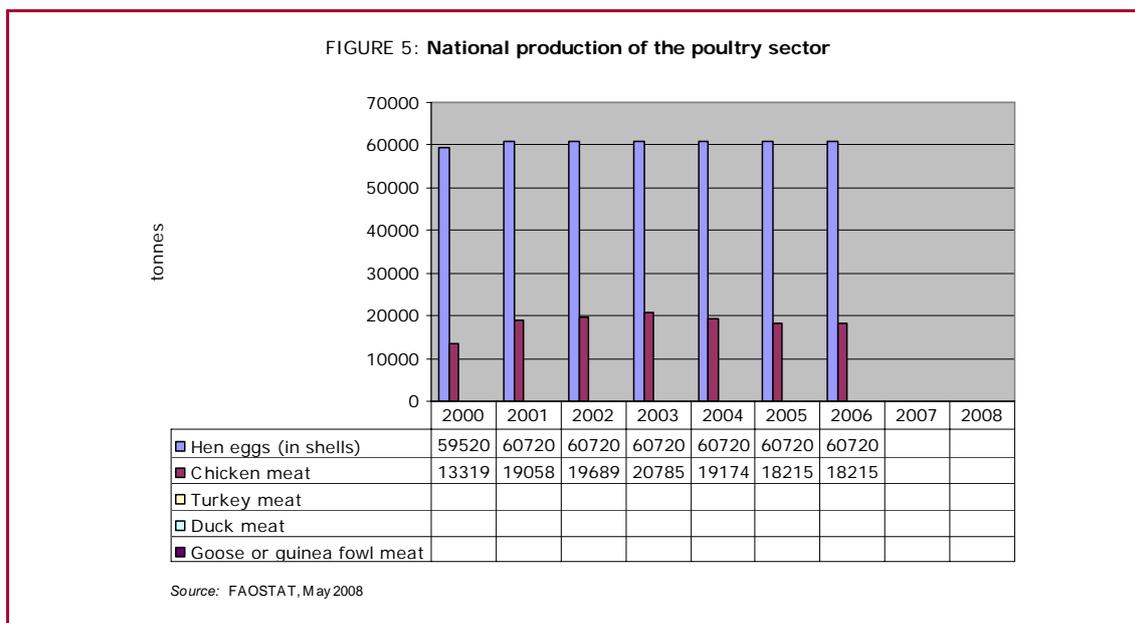
**TABLE 3:
Poultry population in the city of Nairobi by poultry type (years 2003 – 2006)**

	Broilers	Layers	Local chickens	Turkeys	Geese	Ducks*	TOTAL
2003	761,510	56,233	31,371	628	467	1,462	861,741
2004	692,730	192,357	117,496	1,401	548	2,617	1,007,149
2005	1,063,200	428,292	117,496	2,478	3,610	5,109	1,620,233
2006	385,560	204,000	157,733	1,890	2,066	6,624	757,873

Source: Draft Annual Report, Nairobi Province Livestock Division, (Personal communication, Nairobi Provincial Livestock Officer, 2007).

* = The figures for turkeys, geese and ducks are for both local and commercial birds in the city

2.3 PRODUCTION



Another source of information shows the following figures for 2004:

TABLE 4:
Estimated egg production (2004)

Type of bird	No of eggs produced (000's)	Estimated value (Ksh)
Indigenous Hens	564,375	2,821,875,000
Hybrid Layers	644,000	3,200,000,000
Total	1,208,375	6,041,875,000

Source: Ministry of Livestock and Fisheries Development annual report, 2004

TABLE 5:
Chicken meat production (2004)

Type of Birds	No Slaughtered	Total meat (MTs)	Value (Ksh; USD)
Indigenous	8,600,000	11,180.0	1,310,000,000
Broilers	4,731,399	7,097.1	1,206,506,740
Culled Layers	690,000	897.0	103,500,000
Total (000s)	14,021,399	19,174	2,620,006,740

Source: Ministry of Livestock and Fisheries Development annual report, 2004

2.4 CONSUMPTION

Figure 6.a and 6.b: Poultry meat (in average calories/capita/day) (in kg/capita/year)

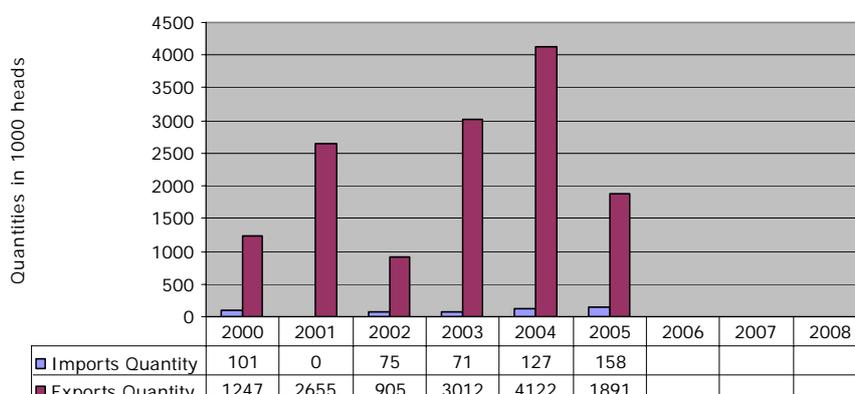
This information has not yet been sourced

Figure 6.c and 6.d: Eggs (in average calories/capita/day) (in eggs/capita/year)

This information has not yet been sourced

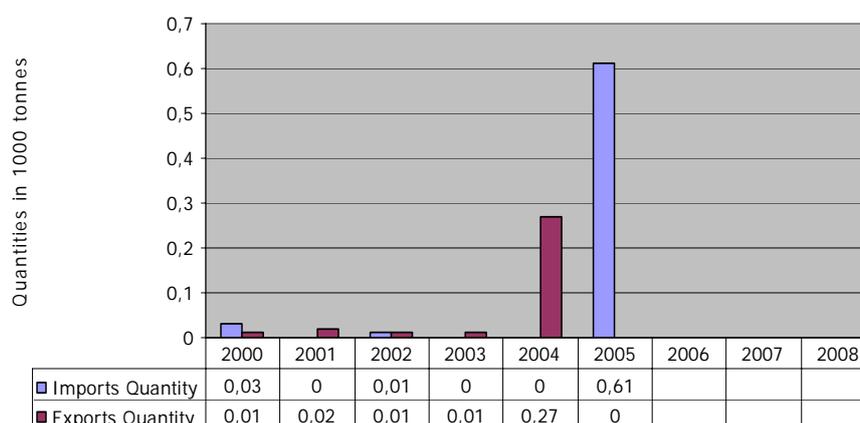
2.5 TRADE

FIGURE 7.a: Import/Export of live chickens (up to 185 g. only)



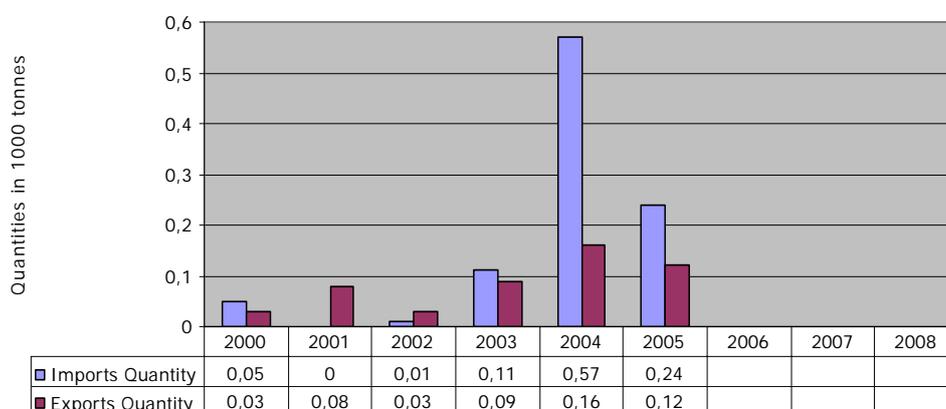
Source: FAOSTAT, August 2008

FIGURE 7.b: Import/Export of chicken meat



Source: FAOSTAT, May 2008

FIGURE 7.c: Import/Export of hen eggs with shells (including hatching eggs)



Source: FAOSTAT, May 2008

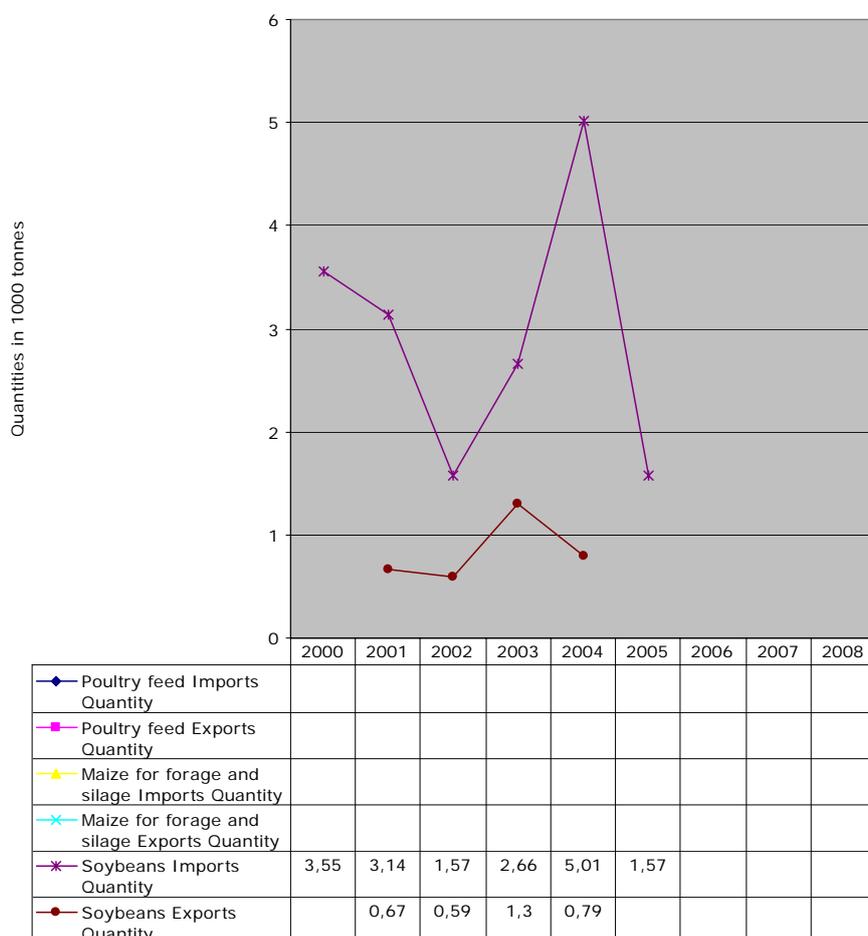
There were no imports or transit traffic in the year 2005 of any poultry or poultry products into Nairobi International Airport. However, in 2006 there was importation of day old chicks, hatching eggs and some live birds (Table 6). These activities may have occurred later in 2006 after the ebbing of the effects of the avian influenza scare.

Table 6:
POULTRY TRAFFIC THROUGH NAIROBI INTERNATIONAL AIRPORT

Year	Hatching Eggs	Turkey	Day old Chicks	Parrot	Pelicans	Parrots	Frozen Chicks	Ducklings	Guinea Fowls	Live Birds	Hatching Eggs	Day old Chicks	Hatching Eggs	Day old Chicks
2002	16,776	2	126,75	1	0	11	0	430	0	0	79,56	88,088	127,116	113,712
2003	0	0	54,302	1	1	2	870	Frozen 1,703	20	18	495,08	0	0	232,615
2004	0	0	145,492	4		20	0	0	0	0	5,986,865	116,614	733	78,7
2005	0	0	0	0	0	0	0	0	0		0	0	0	0
2006	0	0	47,7	0	0	0	0	0	0	5,374	407,88	78,34	0	11,5

Source: Draft Annual Report, Nairobi Province Livestock Division (personal communication, Nairobi Provincial Livestock Officer, 2007).

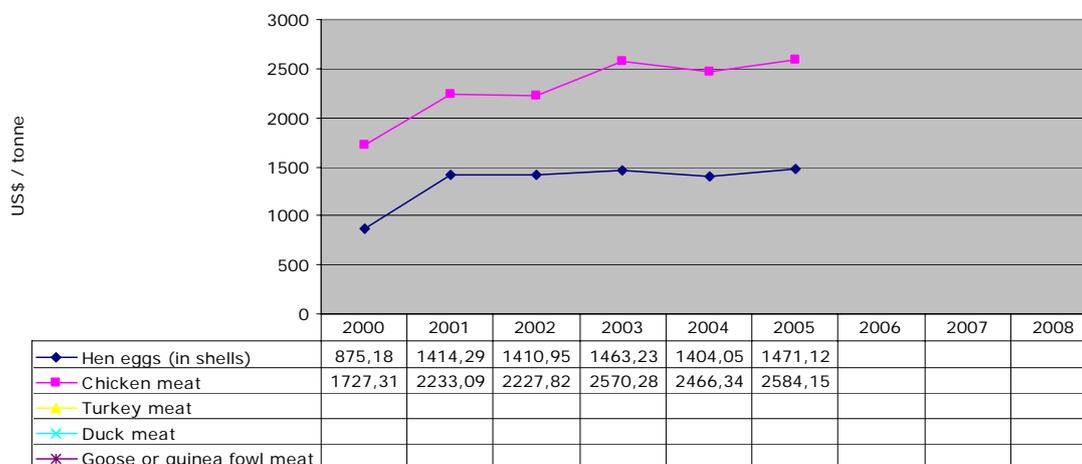
FIGURE 7.d: Import/Export of poultry feed and feed ingredients (maize, soybeans)



Source: FAOSTAT, May 2008

2.6 PRICES

FIGURE 8: Producer price (US\$/tonne)



Source: FAOSTAT, May 2008

Figure 9 Consumer price (US\$/tonne)

This information has not yet been sourced

TABLE 7:
Prices of eggs and poultry at different selling points (in K. shillings; USD 1 = Ksh 65.00)

	1996	1997	2007
Eggs at farm gate(per tray of 30)	140 – 150	150 - 160	150-180
Eggs at retail market (per tray of 30)	180 – 210	180 - 210	210
Mature local cock	200 – 300	250 - 350	600
Mature hybrid cock	300 – 350	300 - 350	700
Pullets (10-12 weeks old)	180 – 200	200 - 250	350
Pullets (at point of lay)	300 – 350	350 - 400	450
Day old layer chicks	59	59 - 65	80
Day old broiler chicks	39	39 - 50	55
Day old cockerels	8	08 - 10	10
Ducks - female	200 – 250	200 - 250	500
Ducks - male	280 – 320	280 - 350	500
Turkey - female	500 – 600	600 - 700	3500
Turkey - male	800 – 900	800-1000	3700

Source: Ministry of Agriculture and Livestock Development annual report, 1997 together with interviews with stakeholders during the 2007 study

Chapter 3

Poultry production systems

TABLE 8:
FAO classification of poultry production systems

Sectors (FAO/definition)	Poultry production systems			
	Industrial and integrated	Commercial		Village or backyard
		Bio-security		
		High	Low	
Sector 1	Sector 2	Sector 3	Sector 4	
Biosecurity	High	Mod-High	Low	Low
Market outputs	Export and urban	Urban/rural	Live urban/rural	Rural/urban
Dependence on market for inputs	High	High	High	Low
Dependence on goods roads	High	High	High	Low
Location	Near capital and major cities	Near capital and major cities	Smaller towns and rural areas	Everywhere. Dominates in remote areas
Birds kept	Indoors	Indoors	Indoors/Part-time outdoors	Out most of the day
Shed	Closed	Closed	Closed/Open	Open
Contact with other chickens	None	None	Yes	Yes
Contact with ducks	None	None	Yes	Yes
Contact with other domestic birds	None	None	Yes	Yes
Contact with wildlife	None	None	Yes	Yes
Veterinary service	Own Veterinarian	Pays for veterinary service	Pays for veterinary service	Irregular, depends on govt vet service
Source of medicine and vaccine	Market	Market	Market	Government and market
Source of technical information	Company and associates	Sellers of inputs	Sellers of inputs	Government extension service
Source of finance	Banks and own	Banks and own	Banks and private ²	Private and banks
Breed of poultry	Commercial	Commercial	Commercial	Native
Food security of owner	High	Ok	Ok	From ok to bad

Sector 1: Industrial integrated system with high level of biosecurity and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity).

Sector 2: Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).

Sector 3: Commercial poultry production system with low to minimal biosecurity and birds/products entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl).

Sector 4: Village or backyard production with minimal biosecurity and birds/products consumed locally.

² Money lenders, relatives, friends, etc.

3.1 BACKGROUND INFORMATION

Agriculture contributes 25-26% of GDP in Kenya with poultry playing a major role, representing 30% of the agricultural contribution to GDP. Most rural families in Kenya (an estimated 75%) keep chicken. Indigenous chickens contribute 71% of the total egg and poultry meat produced in Kenya and therefore impact significantly on the rural trade, welfare and food security of smallholder farmers. The average household is reported to keep 13 birds per flock. Commercial poultry are concentrated in the urban centres of Nairobi, Mombasa, Nakuru, Kisumu and Nyeri where ready markets are available. This has led to the growth of commercial hatcheries located in the peri-urban areas, which sell hybrid broiler and layer chicks to commercial farmers.

With the indigenous birds having high returns yielded by low inputs, the farmers can keep production at subsistence level. However, the introduction of hybrid egg layers in early 2002 in ASAL districts of Kitui, Kwale and Taita Taveta and the recent encouragement of poultry farmers in Makueni District to farm poultry as a business enterprise has introduced a commercial angle to the keeping of indigenous chicken.

3.2 SECTOR 1: INDUSTRIAL AND INTEGRATED PRODUCTION

One poultry company (Kenchic) has operations that qualified it to be classified as a Sector one farming system. It has six breeding farms with a total flock capacity of approximately 100,000 birds. The company headquarters is located in Libra house in the industrial area of the city of Nairobi, along the main road to Jomo Kenyatta International Airport. The main hatchery and one breeding farm are located in Athi River, 40 kilometers from the city of Nairobi. There are six outlying breeding farms located along a 70 kilometer road towards Kajiado Town and they are separated by 10 - 15 kilometers from one another. There is one more hatchery in one of these breeding flocks and another one in Kisumu city 500 kilometers to the west of the city of Nairobi to supply the Western side of Kenya with broilers only. They also have offices in Mombasa, Nakuru, Nyeri and Kisii which ensure farmers get birds as locally as possible.

Contract farmers

The company has a vertically integrated broiler contract operation with selected farmers who meet the selection criteria. Among the major inclusion criteria considered for recruitment into the contracting system is for the farm to be located within 50 km of the city of Nairobi and to have flock houses that can carry 3,000 birds per house. The farmers may keep as many flocks as they like in multiples of 3,000 birds per house. Thus, flock sizes in the contract farms range from 3000 -12,000 birds per farm.

The contract farmers are notified three weeks in advance of the placement date. They then clean and decontaminate the flock houses and prepare them to receive the day old chicks. The farmers are supplied with feeds, drugs, and veterinary services by a company veterinarian. All the broilers are taken to the slaughter house in one all-in all-out operation. The Company processes the birds in their own abattoir, packages and sells the processed birds into the market. The abattoir is located at a place called Tigoni which is far from any company or contractor chicken flocks and at least 30 kilometers from the laboratory or the head office. The laboratory is located in Westlands, one of the suburbs of the city of Nairobi and is separately located from any of the other company operations. It is used to monitor vaccination efficacy in the flocks, test environmental samples from the houses during cleaning and carry out routine disease diagnostic services.

Feed resources

The company does not manufacture its own feeds. Instead they contract feed manufacturers to supply feed on a regular basis to all their operations. The feed is made by Unga feed millers and produced to company specifications. It is delivered to the breeding farms and to the contract farms on specific orders. The feed quality is high. In one farm house at the main hatchery, the feed is delivered in bulk and put into a silo for automatic feeding in a flock house carrying 20,000 birds. Feed microbial analysis is carried out at the company laboratory but the feed quality is monitored at the feed manufacturer's operations and at the Kenya Bureau of Standards.

3.3 SECTORS 2 AND 3: OTHER COMMERCIAL PRODUCTION SYSTEMS

3.3.1 Breeding stocks and hatching eggs

The number of day old chicks produced by the four major commercial hatcheries is shown in Table 9 for the year 2004. There were other small capacity hatcheries producing small numbers of day old chicks. However, not all of the chicks produced are sold in the Kenyan markets since 42% of chicks hatched are exported to neighbouring countries.

TABLE 9:
Day old chicks produced by the main hatcheries

Hatchery	Layers	Broilers	Total
Kenchic	2,900,000	10,100,000	13,000,000
Sigma	300,000	700,000	1,000,000
Kenbrid	780,000	312,000	1,092,000
Muguku	384,000	768,000	1,152,000
Total	4,364,000	11,880,000	16,244,000

Source: MLFD annual report, 2004/004

Each of the chicken hatcheries has between 10,000-12,000 layer breeding flocks and 10,000 to 18,000 broiler breeding flocks per year producing between 300,000 to 800,000 day old layer chicks and 750,000 to 1,200,000 day old broiler chicks per year. Work in Sector 2 chicken hatcheries is generally carried out by women.

These operations hatch day-old layer and broiler chicks and sell to willing buyers on a non-integrated basis. Farmers place their orders for day old layer and broiler chicks with the respective hatcheries and later collect the birds on the due dates. There may be a waiting period of two to four months before they can have the orders fulfilled. The hatcheries also sell cockerels and un-settable eggs to willing buyers. They dispose of their culled spent hens at the farm office by selling single birds at a time to buyers at the farm office and to buyers from the Nairobi city wholesale market dealers when the whole flock is to be disposed of.

Their hatchery operations have medium-scale hygiene procedures. Some of them also keep cattle and sheep on their farm and some (eg Sigma Supplies) also make feed for sale to the general public and for use by their own flocks.

The names of the hatcheries and where they are located are shown below:

Muguku Poultry	Kikuyu
Sigma Supplies	Nairobi city
Kenbrid	Naivasha
Western Kenya hatcheries	Webuye
Bixa	North coast, Mombasa
Lake Chick hatcheries	Kisumu city

3.3.2 Broiler meat

Farms in this category keep 300 - 2,000 broilers per farm for commercial purposes. Most of these farmers are not integrated with any hatchery operation.

Source of broiler chicks and feeds

These farmers source day old chicks from any hatchery of their choice. They buy feeds from the ordinary feed shop and drugs from the nearest shop selling veterinary drugs and other chemicals used in agriculture such as fertilizers and pesticides ("Agrovet" shops). There are many feed millers so the farmers will not lack feed supply but the quality may vary from one source to another. Sometimes the farmers may add other ingredients into the commercial feeds, such as maize, wheat bran or fish meal, ostensibly to quicken the growth. The effect of such additions to the performance of the broilers has not been investigated.

Slaughter and marketing of broilers

All these farmers are independent of any integrated operations and since there is no co-operative for selling either eggs or poultry meat, they market the final products on an individual basis. Slaughtering of broilers is done at home. For farmers in urban and peri-urban areas, a Government meat inspector comes to inspect the carcasses and issues a certificate and a movement permit to facilitate transportation to the markets. Thus once broilers are processed, they are packed and transported to the market direct. Some farmers may have deep freezers where they keep the processed birds until they deliver orders to the target market. Some of the farmers with freezers may buy broilers from neighbours to store in the freezers until sold. Broilers are always sold dressed whether by the smallholder farmers or the commercial producers but not as live birds. This is perhaps because they would lose weight quickly if not sold within two or three days of getting to the market in which case the seller would incur a big loss. Only spent broiler layers and cocks may be seen being sold alive at the Burma and city market.

Work allocation by gender

For broilers, it is the women who keep and feed the birds together with an employed poultry farmhand who is usually a man. When there are no employees, the women feed both broilers and layers while the men are away at work. In smallholder households, ownership of broiler flocks is split half and half between men and women. However, in most of the non-integrated broiler farms, the women raise the birds and the men go to look for market outlets and arrange for slaughter.

3.3.3 Hen table eggs

Farms in this category are small-scale production systems keeping layer flocks of 100 - 1,000 layers per farm. Most farmers keeping layers have flock sizes of 400 - 600 birds. Commercial layer farmers may also keep broilers but the majority only keep layers. The farms are not integrated with any hatchery and are therefore managed on a free-lance basis. They source their day old chicks from any hatchery of their choice and they will look for a market for their eggs.

Source of layer chicks and feeds

The farmers obtain day old layer chicks and feeds from the same sources as the broilers. Some progressive farmers make their own feeds at the farm.

Growing layer birds

Brooding is usually done for up to four weeks and then there is a period when the pullets grow up to five months (24-26 weeks) at which time the first egg drops. At this time the birds which have not grown well are culled away or kept in a separate pen and given additional feed and multivitamins until they start laying. A good layer will have a well formed comb, which is shiny and red, bright eyes, a good body trunk and a vent size which can accommodate three fingers. If the farmer feeds the chickens according to the recommended protocol, most birds will have attained well-formed bodies and only a few will be culled at this time. Vaccinations are also given as recommended by the veterinary department depending upon the disease challenge in the country.

When the egg production drops to below 45%, the birds are depopulated which may be at between 18-24 months of age. However, unproductive birds are culled and removed from the flock at any time in the process.

Marketing in layer flocks

Eggs are collected daily and packed to the number of trays on order. Freelance farmers, on the other hand, pack the eggs in trays of 30, stack the trays and transport them by bicycle, personal vehicle or public transport to the nearest local market where they are displayed in the open just like any other commodity for sale. Farmers who are able to secure contracts to supply restaurants and hotels may take eggs directly there without going to the local market. Any eggs that are not bought are returned home and taken to the market on the next market day. The empty trays are taken home and re-used.

In most households of Sector 3, it is the women who own and feed the layer chickens and it is mostly the women who go to the markets to sell eggs. Some men, however, might be seen carrying eggs to the market on bicycles and in private cars when delivering orders to restaurants.

3.3.4 Other species

Turkey

There is only one commercial turkey farm in East Africa, the Nyonjoro Nightingale Farm. It is located in Naivasha on the slopes of a mountain range. The farm carries between 10,000-25,000 birds three times a year of broiler turkeys hatched from their own hatchery. The breeding stock is usually imported from the United Kingdom.

Feeds are purchased from Unga Feeds and stored in a warehouse. Water is from a borehole on the farm and is treated before use. Birds are slaughtered when they reach either 4 or 11 kg dressed weight after 4 and 5 - 8 months respectively according to orders from the processing plants. Ante-mortem and post-mortem inspection is carried out by qualified personnel. The dressed turkeys are sold on a contract basis to Farmers Choice (80%) and Kenchic (20%) meat processors who then process them further, package and sell the final products to target markets in supermarkets and hotels. Any birds with in-between weights other than those mentioned above may be slaughtered but only on order.

Duck hatchery operations

In June 2006, Ruaraka duck farm re-located to Naivasha and continues to be the only commercial duck farm in the country. The ducks are slaughtered on the farm and the dressed carcasses transported to Nairobi for further processing by a meat processing and packing company.

Mixed species hatchery

The hatchery is located on the north coast of Mombasa and hatches guinea fowls, quails and ducks which are then grown to 6-8 weeks old or older depending upon the type of order. They supply guinea fowls to Nairobi.

Ostrich farming and hatchery operations

Ostrich farming was well developed in the 1970's and 1980's and many farmers kept ostriches in many parts of Kenya. The ostriches are domesticated from the wild under license from Kenya Wildlife Services. Although a number of farms are licensed to grow ostriches (see Table 10), only one farm was economically viable and is currently in operation at the time this review was conducted. This is the Maasai Ostrich farm in Kajiado. The farm comprises a feed manufacturing facility and storage, a hatchery and different open pens for various ages of bird. Feed is made at the farm and given to the birds. The birds nest in the open pens as they would in the wild environment. Eggs are collected, placed in the hatchery for incubation and the hatched chicks reared in the farm. Birds are slaughtered on site and any waste disposed of by burial.

TABLE 10:
Farms licensed to raise ostriches

Farm	Location
Ostrich Farming	Naivasha
Ukunda Farm Park	Ukunda
Kedowa Ostrich Farm	Kericho
Maasai Ostrich Farm	Kajiado

3.4 SECTOR 4: VILLAGE OR BACKYARD PRODUCTION

This sector comprises indigenous chicken, ducks and turkeys and other poultry types kept in the rural areas and in urban informal settlements by smallholder households. The numbers kept in the home for each species vary depending upon the family interests and the region where the birds are found.

3.4.1 Chickens

There are estimated to be 21 million indigenous chicken of which 50% are assumed to be immature. The hen to cock ratio is 7:1. Indigenous hens produce an average of 60 eggs per year. In addition, 40% of the indigenous birds that are reared each year are slaughtered at an average dressed weight of 1.5kg per bird (MLFD, annual report, 2004).

Source of birds and feeds

It is estimated that 75% of the households in Kenya keep indigenous chickens. They obtain the initial breeding hens and cock as gifts from friends or neighbours or they purchase the birds from local live markets. Thereafter the breeding stock is selected from the growers in the home. The birds scavenge for feed in the home environment and at times they may be given home food left-overs or - if the farmer can afford it - supplementary feed like maize grains, cassava, sweet potatoes or commercial feed.

Growing indigenous poultry

Once the initial hens and cock are brought home and they reach a mature age, estimated by Upton (2004) to be 225 days, fertile eggs are laid by the hens in nests which the owners make in the chicken house or in the family house. They lay up to an average of 20 eggs per clutch. In one year the average production is estimated at 60 eggs per hen (MLFD, 2004) with a hatchability of 90% (Upton, 2004). The hens turn broody and sit on the eggs for a period of 21 days when the eggs hatch. They brood the hatched chicks for four to six weeks and then wean them off. They then resume laying eggs once again. Three to four such cycles may be repeated per hen in one year. The indigenous chickens may usually time the hatching of their chicks to the time when there is abundant scavenging feed resources in the environment. One farmer visited during the review period used the broody hens as an incubator whereby once the hen hatched all the eggs in one clutch, the chicks were taken away and replaced immediately with fresh eggs while the hen was still broody and sitting on the eggs. This way the hen would hatch two to three batches of eggs before she could be allowed to brood the hatched chicks.

Marketing of indigenous poultry

Most indigenous chickens are kept for home consumption and for sale (Kimani, 2006). Fifty percent of the eggs produced are eaten or sold (Upton, 2004). The sale of eggs is done at the farm gate or the local market. Growing pullets and cocks of between four to six months that weigh 1.5kg to 2.0kg are sold at the farm gate or at the local market and subsequently at the primary collection point. The birds are transported to reach the Provincial Municipal sales and licensed slaughter houses and later reach the Nairobi wholesale city market. Individual birds may be sold here or at retail satellite chicken and egg kiosks distributed in all city housing estates (see Annex V). Women sell both eggs and live chicken at the farm gates to buyers who are usually men. It is men who act as primary and secondary collectors and also sales persons at the municipal slaughter houses. In the satellite chicken and egg sales kiosks and the main live bird market found in the capital city of Nairobi, most sellers are men. However, a number of women own the satellite kiosks but employ a young man to assist with the slaughtering.

3.4.2 Ducks

In many homes found in the peri-urban areas of Nairobi City and in the rural homes of Central, Nyanza, Coast and Eastern Province, there are households with two to six turkeys. A similar number of ducks may also be kept. However, there are more ducks in informal settlements in the urban areas. Most of the turkeys and ducks are not kept for commercial purposes but as a hobby, although they may be sold whenever need arises. At times, the turkeys and ducks are taken to the Annual Agriculture Shows in the Provincial Headquarters or in the city of Nairobi. While it is the women who keep and own ducks and local turkeys, both men and women may sell these birds at the farm gate. However, the subsequent marketing is entirely a male affair. It is men who sell ducks, geese and turkeys on the roadside open markets and women rarely get involved.

The turkeys are kept in mixed flocks with chicken or together with chicken and ducks. The turkeys produce four to six poults once or twice a year depending upon the quality of feed, the presence of a turkey tom and husbandry practices at the farm. It is estimated that 30,000 turkeys were kept annually during the period 2001 to 2006. Only minimal bio-security measures are observed on these farms and in the event of any avian influenza outbreaks, such birds would be a very effective H5N1 multiplier system.

3.5 POULTRY VALUE CHAIN ANALYSIS

3.5.1 Day-old chicks

See Section 3.3.1

3.5.2 Chicken meat

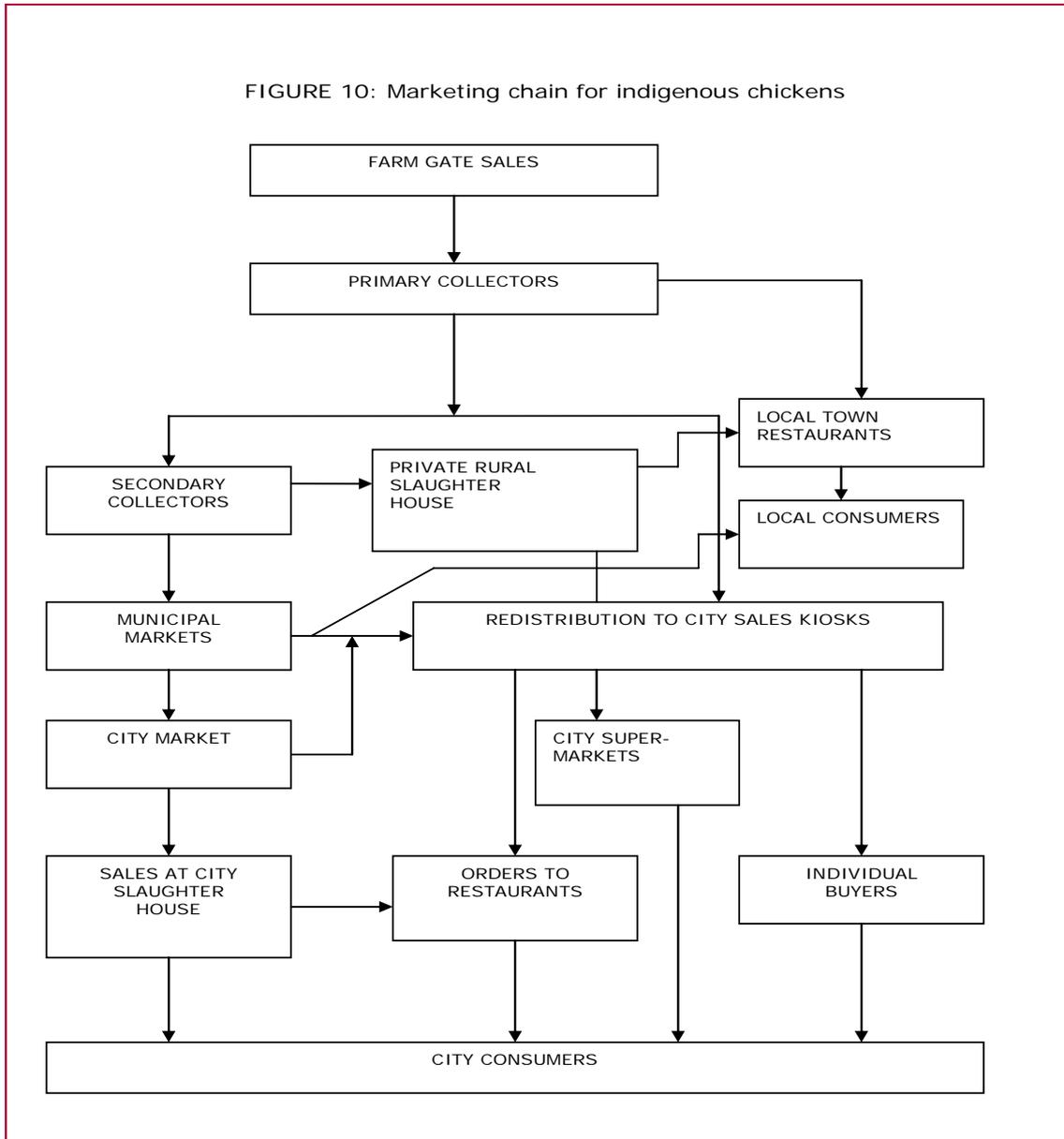
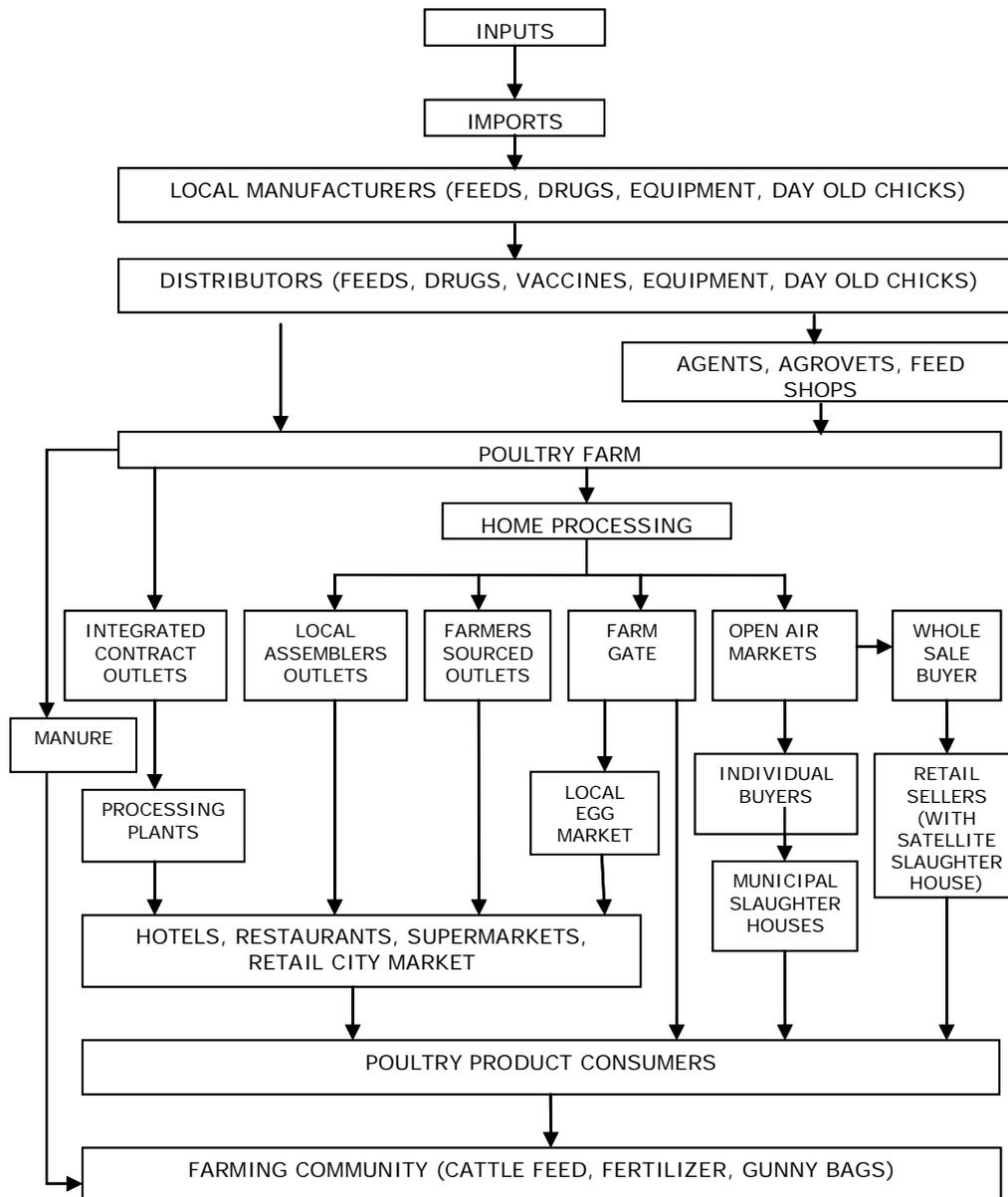


FIGURE 11: Marketing chain for commercial and village production



The overall marketing of poultry and their products is summarised in Table 11.

TABLE 11:
Summary of poultry marketing channels

Market level	Poultry sector			
	Sector 1	Sector 2	Sector 3	Sector 4
Farm gate	-	+ ^a	+	+
Village market	-	-	-	+
Local Village market	-	-	-	+
District / Municipal market	-	+	-	+
City market	-	+	+	+
Selected slaughter house	+	-	- ^b	+
Supermarkets	+	+	+	+ ^c
Restaurant	+	-	+	+ ^d
Franchised outlets	+	-	-	-

^a = Spent breeder flocks

^b = Broilers slaughtered at home

^c = Makueni Styles slaughter house selling to local and city hotels

^d = Local district hotels and restaurants, and some city restaurants.

3.5.3 Table eggs

This information has not yet been sourced.

3.5.4 Other species

This information has not yet been sourced.

Chapter 4

Trade, marketing and markets

4.1 DOMESTIC MARKET

This information has not yet been sourced.

Table 12: Distribution of markets

This information has not yet been sourced.

4.2 IMPORT

This information has not yet been sourced.

4.3 EXPORT

This information has not yet been sourced.

4.4 SLAUGHTERING FACILITIES

The slaughtering process is the terminal stage for the marketing of poultry and breaches in bio-security are likely to occur here most often. These breaks in bio-security will need special attention in view of the threat of an avian influenza disease outbreak. This section will consider the entire system from those who slaughter one bird to eat at home, to those who slaughter broilers at home for sale to the slaughter of many birds at the abattoirs.

Home slaughter of indigenous poultry

The slaughter of one or two chickens for home use is carried out in the home whereby the chicken is killed and immersed in hot water and de-feathered. The internal organs and the feathers may be buried or left for consumption by the household dog. It is the boys or the mother who do the slaughtering in most cases. This is done for all poultry types whether it is indigenous birds, broilers or spent hens killed for home consumption. The feathers and other waste from the slaughtering process are dumped in the home garden or buried, posing bio-security flaws that the farmer needs to be aware of and attend to.

Home slaughter of broilers and spent hens

Broiler farmers with a few birds may slaughter them themselves, whereas when 100 or more birds are involved, the farmer will usually call traders from the city market to come and do the slaughtering. The farmers may also recruit other persons to do the home slaughter. In all these situations, water is used to scald the birds and the de-feathering is done at the farm. Feathers, waste water and the offals are disposed of by burial. Spent hens are usually sold to middlemen who may decide to slaughter the birds at the home of the farmer or take the spent hens to the city for sale.

Municipal slaughter houses

The process of slaughtering at the municipal house is common in all the municipalities in the country. and the process at Thika municipal slaughter house is described below as an example (see Annex V for images).

All the birds are kept in cages. Birds are killed, put in a bucket and taken outside where they are dipped in a drum with hot water and turned around for about 5 minutes then they are removed, put in a wheelbarrow and wheeled back into the abattoir and de-feathered by hand. De-feathered birds are washed clean in running water and placed on concrete slab tables for evisceration, by cutting one side of the abdomen and extracting all the viscera. The cloacal end is also cut to remove the intestines. The bird is turned to face the operator

and the skin is sliced over the crop. The crop and the oesophagus and trachea are eased from their attachments for easy removal. The neck is severed near the head end and the head cut off and kept together with the intestines. The liver and gizzard are washed and stuffed back into the bird or kept separately if the owner does not want them in the carcass. The bird is washed again and water drained by holding the bird in one hand. The bird is kept on the bench for inspection and stamping with the official inspection stamp and thereafter put in plastic bags for the customer. If there are a large number of birds, they are put in a clean plastic sack for transportation to the target destination.

Biosecurity issues at the municipal slaughter house

- Slaughter room: The table tops are easily cleanable and there are enamel tiles on the walls. The floor is rough although it is of concrete and wet feathers are strewn all over the floor. Water runs on the floor and out into general municipal drainage. This could be a source of disease spread to the outside.
- Feathers: These are strained free from water and put in the municipal dump collection tank with the rest of the market waste. They are collected by the municipal council vehicles just like any dirt and deposited where the rest of the municipal waste is dumped. Disease could easily spread from the dump-site to the food chain and humans via wild birds and other vermin accessing the dump-site.
- Offal: Legs, heads, intestines and livers are collected, pooled and sold for soup preparation to willing buyers. It would not be possible to trace persons who have bought any of these items in the event of a disease outbreak. Virus could spread to birds and humans via the sale and consumption of offal.
- Cages and the slaughter house room: These are dusty and personal effects are kept on top shelves which may carry disease to homes. There are padlocks for bird safety. Wild birds could not enter the slaughter slab to spread or pick disease agents
- Veterinary inspection certification: The process is well done and effective. The meat inspector is always present and has a good rapport with sellers and slaughtering personnel
- Personnel: The meat inspector is from the veterinary department. There is no cooperative so sellers are on an individual basis and owners slaughter their own chickens. There is a lot of human traffic movement and no protective gear worn.
- Location of slaughter facility: Next to a butchery, a drug store and a trader selling other goods. This is likely to pose several bio-security issues to those nearby.
- There is no isolation of traffic or adequate sanitary measures for the workers and the entire premises which would occasion flaws in bio-security.

General recommendations for municipal slaughter houses

- Provide slaughter house workers with protective gear. Provide special passes to control people allowed to enter into the slaughter premises. Costs can be recovered from the proceeds per bird.
- Make floors of a solid washable and drainable surface. Collect feathers more often and create a conveyor process. Disinfect the floor and the table tops appropriately.
- Clean and disinfect cages more often and remove chicken waste more frequently.
- Remove personal effects to a separate place in the slaughter slab.
- Paint the inside of the building with washable water-resistant paint.
- Carry out scalding in more appropriate facilities.
- Disinfect the floor and all the equipment used for slaughtering at the end of each day.
- Dispose of feathers after decontamination or take them to a separate location where they can be composted effectively in a controlled manner away from the other municipal waste.

Slaughtering at the rural indigenous chicken Makueni Styles slaughter house

In order to encourage rural households to improve their livelihoods, local poultry producer associations were formed in village settings in Makueni District. Two slaughter houses were then established as a private sector linkage to provide a poultry marketing outlet for the associations. One is located at Makueni, the Makueni Styles Slaughter House (K) Limited and the other at Sultan Hamud, the Farm to Plate (K) Limited Slaughter House. The Makueni slaughter house – which is located on a plot away from all other buildings – is described here. Makueni Styles has a well established marketing system whereby they regularly purchase birds from farmers each day through their appropriate agents who buy birds from collectors at local markets on a fixed schedule (Table 13).

TABLE 13:
Weekly schedule of chicken purchasing for makueni styles (K) Ltd

Day	Local Township Market	No. of Agents	Expected Avg. No. of birds	Day birds arrived at slaughter house	Remarks
Saturday	Kalawa	4	100	Monday	Transport problem
Monday	Kilala	3	80	Monday	Competition from Nairobi buyers
Tuesday	Kathonzweni	3	150	Tuesday	
Wednesday	Mbumbuni	1	70	Wednesday	Competition from Nairobi buyers
Thursday	Kathiani	1	100	Thursday	
"	Nthungu	1	80	Friday	
Friday	Mavindini	4	150	Saturday	Birds stay overnight due to transport problems
"	Wote	2	100		Competition from Nairobi buyers
Sunday	Mukuyuni	1	60	Sunday	
		20	890		

Due to transport problems some birds stay overnight or for two days before they are delivered to the slaughter house depending on the township. The collector agent is paid cash per kilogram live weight. The birds are inspected ante-mortem upon arrival at the slaughter house and any sick bird is rejected. The birds are kept in the preliminary holding house and later transferred to the smaller holding house adjacent to the slaughter room.

Birds are taken from the ante-mortem inspection room and hung upside down in a bucket funnel where the necks are severed and the blood left to drain through to the outside. A bucket is used to collect all the blood for the entire slaughtered batch. The blood is then dried, heated and the powder mixed to make home-made chicken feed. Birds are dry-plucked to remove all the feathers. The gut system is teased out and cut at the cloacae and then gently removed without spilling any intestinal contents on to the carcass. The inside of the carcass is cleaned with a cloth dipped in warm water and the excess squeezed out. The carcasses are then inspected and a permit issued for the transportation to the market.

There is no water used during the slaughtering since the de-feathering is by dry plucking. However, the premises are cleaned very thoroughly with water following slaughter. Carcasses are packed in polythene bags and transported to a deep freezer located in a shop 500 metres away in Makueni town.

All the feathers are collected and burned in a concrete pit on one corner of the plot. The floor and slaughtering equipment are washed and the water directed through cemented open channels to two soak pits which are filled alternately. Once full, an exhaustor drains the waste and disposes of it as with any other liquid municipal waste. We were not made aware how and where this municipal waste is disposed. The internal organs and the heads and shanks are put in a digester disposal pit.

The possibility of disease spread starts when the birds are collected at the local markets. Transport to the slaughter house is by bicycle or small buses. The overnight stay at the collection markets creates a focus where disease organisms can accumulate and clean birds become infected. The holding house at the slaughter house is easy to clean and disinfect. However, if there were H5N1 avian influenza infected birds, the attendants would be exposed to a very high concentration of viruses in the droplets and aerosols generated by the birds in the slaughter house holding house. While we stood at one of the open windows one could feel the chicken dust plumes flowing from the inside the house. The exposure would be heavy for the period inside. In addition, the dry plucking method generates a lot of dry feathers falling all over the floor and these feathers would be a source for human infection during the cleaning process. Nonetheless, the slaughter house cleaning seemed to be very thoroughly and effectively done and the workers had good protective clothing

Satellite "chicken and egg" slaughter facilities in the city of Nairobi

Once birds get to Nairobi they are collected at the wholesale markets in Kariokor or Barma markets. From here retail traders buy birds for retail sale at their chicken and egg satellite kiosks, which are licensed to sell indigenous chicken and eggs. There are many bio-security flaws here. They carry out wet slaughtering and have difficulties disposing of feather, waste water and offal. At times the offal are sold out for soup. There is neither isolation nor control since the birds are in open cages and the traders go to the city market on a daily basis to purchase birds. Sanitation and personal hygiene leave a lot to be desired. Buyers move freely close to the kiosk to select the birds of their choice and they would be exposed to disease agents in the event of avian influenza outbreak.

Slaughter in the local open village collection points

During collection at the village local markets there may be slaughtering going on. This is dry slaughter and feathers are spread widely which would pose several bio-security risks.

Poultry slaughter in Nairobi City

Data on poultry that originated from the whole country and were slaughtered in the city of Nairobi (Table 14) shows a sharp decline for chickens for 2005.

TABLE 14:
Yearly distribution of slaughtered broiler chickens and ducks in licensed slaughter facilities in the city of Nairobi (2001-2005)

Name of Slaughter house	Type of poultry and the year data were reported										
	2001		2002		2003		2004		2005		
	Chicken	Ducks	Chicken	Ducks	Chicken	Ducks	Chicken	Ducks	Chicken	Ducks	
Rosslyn*	47,452	-	-	-	-	-	-	-	-	-	-
Ruaraka	-	14,897	-	17,032	-	17,339	-	22,983	-	25,444	
Hurlingham	-	-	12,044	-	17,289	-	25,887	-	26,483	-	
Kariokor	12,340	-	23,528	-	27,801	-	27,678	-	12,948	-	
Burma	19,972	-	25,657	-	31,913	-	36,699	-	36,878	-	
TOTAL	79,764	14,897	61,229	17,032	77,003	17,339	90,264	22,983	76,309	25,444	

Source: Draft Annual Report, Nairobi Province Livestock Division (Personal communication, Nairobi Provincial Livestock Officer, 2007).
* = This slaughter house closed in 2002.

During the slaughtering of broilers and ducks and turkeys by commercial processors, men catch the birds from the pen houses and do the stunning, killing, scalding and evisceration while the women do the chilling, portioning and packaging,

4.5 POULTRY FEEDS

Poultry feed contributes 60-70 percent of total production costs and therefore most farmers pay close attention not only to the availability but also to the quality and the proper usage of poultry feeds. Any wastage leads to loss of revenue. Poor quality feeds lead to low growth performance in broilers and poor egg production in layers both leading to marked loss of revenue. There are now a large number of feed millers producing poultry feeds in Kenya

(Table 15) and the quality cannot always be guaranteed in the way it was when only four millers were making the feeds and they were held to account for the quality of their feeds. However, good quality poultry feed is expensive and in the process of trying to save money some farmers purchase low quality feeds and add additional ingredients at home, for example maize, wheat bran, fish and bone meal and additional mineral-vitamin premixes.

Contamination of the feeds with aflatoxin was reported to be a problem. However, there was an efficient test kit and the farmers could access results in a short time. Millers have therefore been careful to avoid using wet grains in the feed manufacture.

TABLE 15:
Poultry feed millers in Kenya (2004)

Miller	Town	Miller	Town
Wawa Feeds	Maragwa	Unga Feeds	Nairobi, Nakuru, Kisumu
Tigoni Feeds	Limuru	ABC Feeds	Nakuru
Atta Millers	Mombasa	United Millers	Kisumu
Sigma Feeds	Nairobi	Milling Corporation	Nakuru
Care vet	Nairobi	Premium Feeds	Nairobi
Kisumuwalla	Mombasa	Farmers Choice	Nairobi
Muus	Thika	Maragua Feeds	Muranga
Meru co-operative	Meru	Superior Feeds	Nairobi
Arkay Feeds	Eldoret	Mutu Feeds	Thika
Diamond Feeds	Mombasa	TigoniMahiu Feeds	Kiambu
Pembe Feeds	Nairobi	Sangalo Millers	Bungoma
Faida Feeds	Kitale	Agrivet Millers	Eldoret
Will Feeds	Maragua	Kapsoit Millers	Kericho
Lens Feeds	Nakuru	Belfast Millers	Nairobi
Njuca Feeds	Thika	Dandora Millers	Nairobi
Hemco Feeds	Nairobi (Kariobangi)	Finn Feeds	Nairobi
Jubilee Feeds	Thika	Kibos Industries	Mombasa
Farm Feeds	Nairobi (Industrial)	Ruaraka Feeds	Nairobi
Ngecha Feeds	Kikuyu	Tam Feeds	Nairobi
Pwani Feeds	Mombasa	Anifema Feeds	Nakuru
Treasure Feeds	Ruiru	Modern Feeds	Nakuru
Waroro Feeds	Nairobi	Rift Feeds	Nakuru
Champion Feeds	Thika	Equator Feeds	Nakuru
May Feeds	Thika	Midland Millers	Sagana
Lake Feeds	Kisumu	Chania Feeds	Thika
Millenium Feeds	Kisumu		

Source: Ministry of Livestock and Fisheries Development annual report, 2004

TABLE 16:
Prices (in K.Shillings) of poultry feeds (2001-2007)

Feed type	Year						
	2001	2002	2003	2004	2005	2006	2007
Chick/Duck mash//70kg	1,150	1,150	1,150	1,150	1420	1450	1450
Growers mash/70kg	840	840	840	840	1050	1080	1080
Growers mash/20kg	280	280	280	280	350	360	360
Layers mash/70kg	950	950	950	950	1250	1250	1250
Layers mash/20kg	320	320	320	320	420	420	420
Broiler starter/70kg	1,350	1,350	1,350	1,350	1600	1650	1650
Broiler starter/20kg	450	450	450	450	530	550	550
Broiler finisher/70kg	1,100	1,100	1,100	1,100	1450	1450	1500
Broiler finisher/20kg	390	390	390	390	510	510	530

Source: Ministry of Livestock and Fisheries Development annual report, 2004 and stakeholder interviews during the 2007 study.

Chapter 5

Breeds

5.1 EXOTIC BREEDS

In the 1960's pure breeds of chickens were introduced into the country and kept in small numbers. These were Rhode Island Red, Light Sussex, New Hampshire Red, Black Australorps and white leghorns. Later the Plymouth rock, the barred rock and the buff rock were introduced. The period of keeping pure breeds was followed in the 1970's by the introduction of hybrid layer and broiler flocks which were hatched from imported eggs and later from imported breeding stocks grown in the country. A cockerel and pullet exchange programme using Rhode Island Red and Black Shaver birds was introduced in 26 of the then 54 districts of Kenya and this has influenced the local genetic pool in the villages to some extent.

Exotic breeds for egg production are Shaver Starcross, ISA brown, Ross and broiler production bird types are Arbor Acres, Hybro, Cobb (United Kingdom), Hypeco (Holland).

5.2 LOCAL BREEDS

The local Kenyan chicken is characterized by different sizes and plumage colour and is widely distributed throughout the country but as not many places were visited during the current review, it was not possible to find out if any local names were being used in the outlying areas that were not reached. The city poultry marketers did not have special names either. However, in one study carried out at the Coast Province of Kenya by Njenga, S.M (2005) some names were used to describe the phenotypes of the indigenous chickens at the coast and these are given below.

The indigenous bird types are:

- frizzle feathered*
- naked neck*
- barred feathered
- mauve feathered
- black feathered
- dwarf size birds*

*Note * Names used by Njenga*

Indigenous breeding stock

The Ministry of Livestock and Fisheries Development has had an extensive poultry programme in the last thirty years to improve the productivity of indigenous chickens, study the feed requirements and productivity characteristics of the birds and recently also act as a source of breeding stock for farmers wanting to start to keep indigenous chickens. The National Poultry Research Station located at Naivasha is now keeping some breeding stock for the production of indigenous birds for farmers wishing to keep local indigenous chicken as a business venture. In early July 2007 when a visit was made, they had a population of 150 breeding stock. They have a modern hatchery with a capacity of 19,200 eggs per setting. The station grows pullets and cockerel to 2-4 months of age for farmer associations and individual farmers on order. The birds are also used for on station research.

The MLFD is now encouraging smallholder farmers to keep poultry as a business and has a pilot project in Makueni District for this purpose.

Genetic upgrading through cockerel exchange (1976-1994)

(see Annex IV for further information).

The cockerel exchange programme started in 1976 initially in 12 districts and by 1980 another additional 9 districts were included. Later more districts were recruited into the programme and by 1993, 26 out of 54 districts were involved in the programme. However, the districts have since been increased to 75. A hybrid cock was exchanged for the local cock and then all the local cocks were killed. For the pullet exchange, a farmer was required to keep 10-15 pullets. The total number of farmers recruited into the programme and the total number of birds placed are distributed widely in all the administrative provinces of Kenya. The programme was terminated in 1994 after 18 years of implementation.

It can be taken that these farmers acted as foci for the spread of the cross-bred chickens with slightly improved production abilities within the districts through sales of their birds to the open markets where other farmers got access to the improved birds.

No studies have been carried out to determine the extent and distribution of genetic types in the free range chickens in Kenya. However, when one looks at the birds being brought to the markets, it is fairly clear that there is some Rhode Island Red and Sussex blood in many of them but a study is required to determine what genetics comprise the free range indigenous chickens in Kenya and their distribution in the different regions. Studies carried out at the National Poultry Research Station have centered on nutritional requirements, housing and productivity.

Other species

Turkeys

The local turkeys are kept by small-scale farmers in the rural areas and they are bronze and buff. The commercial turkeys are white (imported from United Kingdom or USA) and buff (imported from United Kingdom).

Ducks

Locally adapted Muscovy ducks are kept throughout the country in small numbers but they are kept more around the city of Nairobi and along the coast in Mombasa. Exotic breeds of Muscovy ducks are kept in Nairobi and Naivasha for commercial production.

Geese

Geese are kept as ornamental birds, especially in Nairobi and central province.

Ostriches

The ostriches kept in Kenya are local breeds domesticated from the wild. Farmers are licensed by the Kenya Wildlife Services to keep ostriches that are being promoted by the Ministry of Livestock and Fisheries Development as an emerging livestock. They are farmed in Naiad (Nairobi Area District) and in the other Rift Valley districts.

Guinea fowls

Local Kenya guinea fowls are domesticated from the wild and are kept with the permission of the Kenya Wildlife Services. They are of the helmeted type. Some exotic guinea fowls have been imported from France and Sierra Leone in West Africa but only in small numbers and they are restricted to the coast area.

Quails

The people of Western Kenya have been keeping local quails as a local tradition for a long time. The birds are trapped from the wild and kept in the home to breed or consumed directly after trapping. One farmer is keeping Japanese quails in Nairobi and some are also hatched at the coast.

Pigeons

Local Kenya pigeons are kept throughout the country but only in small numbers. Some homing pigeons are to be found in the Nairobi and Mombasa city estates and around Mosques in Nairobi city where they are fed grains daily by volunteers. Individual farmers keep a few of the pigeons as a hobby.

Peacocks

A peacock and a peahen may be found in the compounds of some of the hotels in esoteric locations in the national parks and in the city of Nairobi suburbs as pets.

Bantams

Two farmers (both located in Nairobi city) keep a breeding flock of Bantams for the annual Agricultural show and to sell to interested persons. The Bantams are usually kept as ornamental birds and not for egg or meat supply to the families.

Chapter 6

Veterinary health, public health, biosecurity measures

6.1 HIGHLY PATHOGENIC AVIAN INFLUENZA

High risk areas for avian influenza transmission in Kenya

Risk factors considered in identifying the high risk areas were as follows:

- Migratory birds flyways and ports of entry for goods and persons
- Wetlands and homing sites for migratory birds
- High human and poultry population density areas
- Free range poultry/Commercial poultry
- Low hygienic standards
- Trade internal or cross border; import and export

TABLE 17:
Locations of high risk areas for avian influenza transmission in Kenya

Region on Migratory Birds Flyways	Population Concentration		Hygiene Standards	Risk level	Special Remarks
	Human	Poultry			
1 North West	Low	Low	Neutral	Low	Region is very arid and populations are sparsely distributed.
2 Western	High	High	Low	High	Culture promotes close contact with chickens
3 Central Rift	High	Medium	High	High	High potential for interaction between migratory & resident wild/domestic birds
4 Nairobi & Central Highlands	High	High	Mixed	High	Dense population with low hygiene in slums & high concentration of commercial poultry farms and open air bird markets
5 Tsavo	Low	Low	Low	Low	High potential for interaction between migratory & resident wild birds
6 Amboseli	Low	Low	Low	Low	Potential for introduction of HPAI from Tanzania
7 Coast	High	Low	High	High	High humidity favours transmission of respiratory infections in humans and animals & open bird markets

Source: Kenya National Avian Influenza Task Force Action Plan, 2006

The effects of the recent avian influenza threat in Kenya

In late November 2005, high mortality was reported in commercial layer birds and wild birds located in different parts of the country. The public announcement through radio and print media report highlighted these outbreaks. This spread fear and panic throughout the country in January to March 2006. This led to a severe drop in demand for poultry meat and eggs, a drop in the purchase of day old chicks for broiler and commercial layers and the boycott of

any poultry products from fast food restaurants. The prices of poultry, poultry meats and eggs fell severely. Many homes removed poultry from home menus.

The panic was exacerbated by the outbreak of Avian Influenza in Southern Sudan. A ban on imports of poultry and poultry products were imposed. Subsequently a consignment of powdered eggs from China was impounded and refused entry into the country and a consignment of poultry soup from Egypt was also rejected at the port of call in Mombasa.

As a measure to control the potential spread of avian influenza, the local slaughter of indigenous poultry was encouraged in Makueni District by establishing two local poultry houses to prevent live birds from being transported to the city.

There was severe loss of revenue by the prime day old chicken hatchery who reported a loss of Ksh.40 million over a period of 2 months (November to December 2005) with loss of business orders over the Christmas period when they usually have peak orders. Jobs were lost in poultry-related industries.

The veterinary department made frantic efforts to send surveillance missions to the border with Southern Sudan and rapid response teams were sent to the sites reported to have high mortalities of domestic or wild birds. Fortunately, the results from samples taken from all these missions proved negative for Avian Influenza.

The surveillance activities need to be strengthened and laboratory diagnostic capacity for quick detection and confirmation of avian influenza H5N1 needs to be developed urgently.

If these reactions arose just from the fear of entry of H5N1 HPAI avian influenza, should the actual disease occur, the damage and impact will be very extensive and many livelihoods will be affected. Fortunes turned positive for the consumption of poultry products when the Rift Valley Fever outbreak occurred in Kenya; beef and goat meat were not available and families and restaurant patrons turned back to poultry meat as alternatives to red meat.

Results of an impact assessment study in Kenya for avian influenza

Socio-economic role of indigenous poultry

In a recent survey (Kimani et al., 2006) farmers were asked to state and rank the roles played by poultry in their livelihoods. The results showed sources of income, house consumption and manure for the farm as the most important roles played by poultry. There were also some non-market values (e.g. socio-cultural and medicinal roles) which are difficult to put monetary values on. Such roles may be quite dear to some communities and could make them refuse to volunteer birds for disposal in an avian influenza outbreak.

Impact of avian influenza on the farming communities

All sectors of poultry in Kenya were reported to be affected by the avian influenza scare that ran from November 2005 to May 2006. The effects were highest for broiler farmers, followed by layer farmers and indigenous farmers were modestly affected. There were four major areas of impact, namely:

- Changes in flock sizes leading to reduced value for poultry
- Forgone or reduced revenue and loss of livelihood due to panic or premature selling.
- Reduced and forgone revenue or loss of livelihood due to cancellation reduced or postponed booking of day old chicks.
- Reduced revenue due to product price changes.

These changes are described below as reported by Kimani et al, (2006).

✓ **Impact due to flock size reduction**

Farmers in Kiambu, Mombasa, Nakuru had the most reduction in broilers, attributed to adverse media reports of dead birds in Kasarani, Nakuru and Nairobi. Other areas did not report declines.

Although the data in the tables indicated a slight increase in the indigenous chickens in year 2005, a survey carried out in year 2006 (Kimani et al, 2006) showed that in that year, there were decreases in indigenous flock sizes in all the surveyed districts, whilst the highest decline for layers was recorded in Taita Taveta, Machakos, Kakamega, Kiambu and Mombasa. It is noted that flock sizes of all types of poultry declined in all surveyed areas only differing by numbers reported, including farmers keeping ducks, turkey and geese

(Kimani et al, 2006).

The reasons farmers gave for the decline in broilers included fear of avian influenza, lack of markets for their products and low prices of broilers. For layers and indigenous birds the decline was attributed to deaths from disease, fear of avian influenza and sale of live birds. Apparently, for farmers keeping turkeys, geese and ducks, poultry sales was the main reason for decline followed by fear of avian influenza. In one district (Taita Taveta), the birds were consumed at home to reduce the number at risk.

✓ ***Losses due to panic or premature selling***

The highest number of farmers who reported panic culling were those with indigenous chickens closely followed by those with layer chickens and the least were farmers keeping turkey, duck and geese. Chicken layers were culled at approximately 5 months earlier than the expected cull date leading to loss of production potential of five months. Prices per bird dropped drastically, and the average figures were: turkeys (Kshs 163), indigenous chickens (Kshs 59) and layers (Kshs 41) respectively. Layer farmers lost three times the revenue compared to indigenous farmers even without considering the forgone production. Broiler farmers with a guaranteed market experienced decreased slaughter but not complete loss. The losses were experienced by the company that processed and sold finished broilers. Since farmers faced different losses depending on the prices of products, compensation planners should carefully consider these different losses when calculating the compensation values per bird.

✓ ***Loss due to postponement, cancellation or reduced bookings of day old chicks***

This loss affected Sector 1 and 2 mainly since they are the ones owning hatcheries. Figures showed that in all the surveyed areas combined, 72% and 52% of the broiler and layer farmers cancelled or reduced their bookings, respectively. This mainly affected the farmers in areas keeping broiler and layer flocks in Nairobi, Nakuru, Uasin Gishu and Kiambu.

Broiler farmers were more affected than layer farmers since broiler markets are more sensitive and broilers in the farm consume feed with no market outlets for mature birds. However, forgone average earnings per bird for broilers was considered to be Kshs 25 per bird while that of a layer was considered to be Kshs 248. Thus when plans are made for compensation, there is need to take into account differential returns per bird accruing to the farmers if the farmers are going to be persuaded to cooperate fully in the control of avian influenza outbreaks.

✓ ***Impact of legal enforcement activities***

The restriction of movement added to the cost of transportation, since traders now had to move to designated slaughter sites or the meat inspector had to be transported to and away from home slaughter. New levies for transport permits and slaughter and inspection fees were all new costs that increased the cost of doing business. Due to the import restrictions on eggs from neighbouring countries, the cost of eggs increased in the Kenyan districts near the borders. Furthermore, hatchery operators in sector 2 could not access sources of day breeding stock since the countries from which they obtained the chicks previously had been put on the banned imports list. Thus business operations affected included hatcheries, supermarkets, live poultry markets, restaurants, animal feed manufacturers, Agro-vet shops and egg traders.

✓ ***Loss due to changes in product prices***

Market stagnation occurred where demand decreased and finished products had to be held longer than usual. Whenever this occurred, price changes were experienced with the most affected being indigenous chickens followed by broilers. However, those broiler farmers with guaranteed markets through contract farming or reliable outlets in restaurants or institutions did not report price changes. Market stagnation was reported by layer farmers with layer birds as well.

The average price changes reported in the surveyed districts for different poultry and poultry products (Table 18) show that different poultry farmers would have disparate price concerns in the face of an outbreak.

TABLE 18:
Impact of an avian influenza scare in Kenya on prices (Ksh and USD) of poultry and their products

Product type	AI Effect on prices	
	Before AI scare	After AI scare
Broilers (Kshs/Kg)	223(USD3.43)	192(USD2.95)
Indigenous eggs (Kshs/Tray)	169(USD2.6)	149(USD2.29)
Commercial eggs (Kshs/Tray)	154(USD2.37)	132(USD2.03)
Indigenous chickens (Kshs/Kg)	198(USD3.05)	144(USD2.22)
Spent Layers (Kshs/Kg)	147(USD2.26)	109(USD1.68)
Turkeys (Kshs/Kg)	512(USD7.88)	375(USD5.77)
Duck	*	*
Geese	*	*

Source: Calculated from figures in Kimani et al, 2006. (* No report made for these two species).

Impact on avian influenza awareness in the general public

The most important impact of the avian influenza threat was on peoples' attitudes to disease in poultry. The general public and those in the poultry industry became aware that an outbreak of avian influenza would cause a devastating effect on the poultry and associated industries that would lead to a significant threat to livelihoods of many people. They also realised that avian influenza is a real threat to human life. It was also learned that the press badly handled the initial announcements but together with the electronic media they were later instrumental in creating better public awareness and understanding of the disease in a very commendable manner. The lesson learned here is that the media are key in the management of any avian influenza preparedness or real outbreak situation.

Official response for the control of avian influenza

In October 2005, the Government of Kenya set up a multi-sectoral National Avian Influenza Task Force to deliberate and advise on the way forward in dealing with the threat of avian influenza. The task force comprises the experts from the animal and human health ministries and all stakeholders in the poultry industry, the National Museums of Kenya, the Kenya Wildlife Services, bilateral and multilateral development partners, the media, civil society and the law enforcement departments. It is co-chaired by the Directors of Medical Services and Veterinary Services.

The National Action Plan was drawn up according to the FAO and WHO guidelines and was prepared according to the activities of the sub-committees listed below. It covers both animal and human aspects of prevention, measures to counter the disease should it occur and necessary emergency preparedness measures. For animal health, the plan is based on preventing the disease from entering the country and institution of control and eradication measures should an outbreak occur. For human health, prevention is the fundamental strategy and if this fails then control and response is adopted

The task force is divided into the following sub-committees:

Epidemiology and Surveillance (ES)

- Laboratory and Research (LR)
- Infection Prevention and Control (IPC)
- Case Management (CM)
- Information, Education, Communication and Social Mobilisation (IEC)
- Co-ordination & Resource Mobilisation (CRM)

The various subcommittees have been working in their respective jurisdictions. The Laboratory subcommittee has been dealing with laboratory capacity building and monitoring the processing of samples taken by the surveillance groups. The Epidemiology and surveillance subcommittee has been carrying out both passive and active surveillance from

selected risk areas of Kenya. All surveillance samples taken from dead and healthy birds have so far been negative for H5N1 HPAI from results of local and reference laboratories.

FAO and the Government of Kenya are implementing the Early Detection of Avian Influenza project and the project on The Structure and Importance of Commercial and Village Based Poultry in Kenya, both supported by FAO.

6.2 OTHER MAJOR POULTRY DISEASES

For regularly updated information on the status of notifiable and other transboundary poultry diseases, please refer to:

The FAO Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases available at www.fao.org/ag/aq/againfo/programmes/en/empres/home.asp

The OIE World Animal Health Information Database (WAHID) available at www.oie.int

In Kenya viral, bacterial, fungal and parasitic infectious disease affect poultry in each of the sectors. The major viral diseases in order of importance are: Newcastle disease; infectious bursal disease; fowl pox; Marek's disease; avian leucosis; epidemic tremour, while the bacterial diseases are fowl typhoid, colibacillosis, Salmonellosis; infectious corrhiza and mycoplasmosis, which are common in all sectors. Coccidiosis is very common in sector 2 and 3 and to some extent in sector 4. When Newcastle disease is eliminated from a flock through vaccination, other diseases seem to appear in the indigenous poultry. Infectious bursal disease prevalence is fairly high in sectors three and 4.

6.3 BIOSECURITY MEASURES

Bio-security in Sector one

All birds are kept indoors and very stringent bio-security procedures (see Annex V) and good personal hygiene by personnel are observed at each of the breeder farms. These bio-security procedures include:

- Separating breeding farms physically by keeping them 10 -15 kilometers apart.
- Gates kept secured and locked.
- No entry of vehicles except those delivering eggs or equipment. All other vehicles, including those belonging to the senior management, are denied entry and are parked outside the farm gate.
- Cleaning and decontamination of all egg trays and their carrying crates at the hatchery, at the breeding farm-gate and then once again at the breeding farm house before eggs are loaded.
- Vehicle disinfection (including under-carriage, wheels and tops of vehicles) at the farm gates and the hatchery gate. The driver does the vehicle spraying and dips his shoes into the disinfectant but it was not possible to establish whether he takes a shower or changes clothes before driving into the premises.
- Shower and change of clothes by all farm workers.
- Quick safe disposal of any dead birds.
- Written standard operating procedures at the various sites to be followed by workers.

Breeding farm housing

The flock houses have cement floors and stone walling up to half height followed by chicken wire to the top of the walls, with roofs of corrugated iron sheets. The wire netting would not allow birds or rodents to enter the houses. However, since the houses are in the open grasslands, birds may land in the open grounds, particularly if there was any spilled water that formed into pools. In each house there was a shower and changing room and at the main gate there was a shower and changing room for personnel and a fumigation chamber for egg trays.

Nonetheless the very high and stringently strict bio-security procedures were observed in all the operations of the company. The company has a diagnostic laboratory which takes environmental samples from the surfaces of the houses in the breeding farms and the contract farms immediately after the houses are cleaned and later after fumigation has been done to check efficacy of cleaning and decontamination. The whole process of decontamination is repeated in failed houses. Blood samples are taken weekly from each of the breeding flocks to test for common pathogens and vaccination responses. Government animal health officers have access to each flock to take samples but they must also observe stringent bio-security protocols.

The flaws in bio-security noted were the presence of wild birds, earth roads, unrestricted human (worker) movement and high possibilities of re-contamination of egg trays. Birds from all the contract farms are carried to the same slaughtering plant at Tigoni and hence the transport vehicles could be a source of bio-security breach.

Bio-security in Sectors 2/3

Breeding stocks and hatching eggs

✓ ***Housing***

Houses are of the open type with iron sheets forming the bottom part of the walls, chicken wire mesh forming the top half of the walls and iron sheet roofing. The houses are located close to each other and there are no general shower facilities for the entire farm nor for the respective separate flock houses. Hatchery houses are open to the farm workers though not to the general public. The hatchery buildings are completely sealed except for the entry doors. They are ventilated artificially through fans. The hatchery houses are close to the main entrance and are not located far apart and separately as in the other hatchery classified as Sector 1. In one hatchery (Muguku Poultry) a stone wall perimeter fence surrounded all the flock houses to provide both security and hygiene. Their flock houses had cement floors. Iron sheets rested on a short stone wall after which there was chicken wire for the rest of the chicken house walling. The roofs were all made of corrugated iron sheets.

✓ ***Waste management***

Waste from the flock houses and the hatchery is disposed in the farm by burial, burning and selling of manure to willing buyers. The manure is not normally composted before selling. At the Muguku farm, there is grass coverage between houses and the space of land to the fence. Manure may be spread on this grass too. The grass cover plays a very significant role as a dumper for dust that may have gone to the houses.

The manure is sold to ordinary farmers, coffee and flower farmers and at times to dairy cow owners, especially during the dry season. Since the manure is not composted in order to kill any micro-organisms before disposal to buyers, in the event of a disease outbreak in the hatchery flocks, the disposed manure would pose a serious bio-security risk by spreading disease to the farms that purchase the manure.

Broiler farms

✓ ***Housing***

The broiler houses usually have earth floors but half of the walls are wire netting while the bottom half is made of mud walls, wooden planks, iron sheets or stone walling depending on the financial status of the farmer. Corrugated iron sheets are normally used for the roofing. Wood shavings are used for the deep litter and water is supplied in commercial drinkers or home made drinkers both manually filled with water. Feeders are wooden troughs, plastic or metal commercial feeders placed conveniently in the poultry house.

✓ ***Waste management***

The litter, feathers and offals are all disposed in the farm by burial within the farm although some of the farmers may heap the waste material to compost it until it is used in the farm as manure or sold. However, the wood shavings from broiler operations are not completely decomposed by the time of disposing the birds unlike in the case for layers where the litter completely turns into dust. Whether or not a farmer composts the manure depends upon how much the farmer knows regarding personal hygiene and bio-security issues. Houses may or may not be cleaned or disinfected before the next intake depending upon the hygiene awareness of the farmer. At times the cobwebs and dust are brushed off with a broom.

Where good hygiene awareness is high, water, detergent and disinfectants are used to clean and decontaminate the poultry house before restocking is done.

✓ **Bio-security risks in broiler farms**

Houses are open and infection can get into the flocks through the wind-borne route. Movement of personnel close to the flock houses is not restricted and poultry workers use home clothes and shoes while in the poultry house. Only in a few farms with high hygiene awareness are poultry workers provided with gumboots and overalls. Movement between farms is not restricted and neighbours usually visit one another even during disease outbreaks to enquire what to do when they experience disease problems, thus spreading disease from one farm to another. There are no footbaths for disinfectants in most farms. Feeding and water equipment and empty feed bags all pose a disease risk if they are not decontaminated properly. The poultry manure and slaughter waste are disposed of in the farm and at times the manure is sold out to be used by neighbours as fertilizer. The manure is normally sold out to outside buyers or spread on own farms but not composted within the farm prior to the sales.

Layer farms

✓ **Housing**

Layer farms with higher numbers observe more hygiene measures and may make the poultry houses of timber or stone walls; these are found either in Thika and Kiambu districts or in the peri-urban areas of Nairobi city.

The general structure of the layer houses are the same as for the broilers except that laying boxes are now provided and that there is more space per square foot per bird. The houses usually have earth floors, the bottom half of the walls are made of stone, iron sheets or wooden planks while the top half is wire netting and the roofs are iron sheets. Some houses have two floors to maximise use of space. Drinkers and feeders may be home-made by farmers with small flocks and are made from cut-out 20 litre jerry cans for drinkers and wooden troughs for feeders. Those with larger layer flocks may have commercial plastic drinkers and feeders. All the layer flock houses have deep litter beddings of wood shavings. The wood shavings usually decay to powdery manure by the time the layers stop laying and are to be depopulated at the age of 18-24 months. The litter has now become very good manure and is sold to willing buyers who come to the farm in a lorry or pick up. The farmer may also use some of the manure if the farm is big and there are crops grown on the farm.

✓ **Bio-security risks in layer farms**

Improper cleaning and decontamination of houses and the social-cultural tradition of farmers showing off their flocks exposes the birds to potential infection. Poor personal hygiene - particularly lack of regular hand-washing, the wearing of home clothes in the poultry house, not wearing gum boots and not wearing head covers leads to the potential entry of disease in the flocks. There are no footbaths on most of these farms. Disposal of litter in the farm and selling litter to neighbours or to farmers living further away creates another bio-security risk whereby disease can be readily spread if the litter is not composted before disposal.

Disposal of culled birds and spent layers becomes a bio-security risk in that there is no organized market for such birds where farmers with large flocks can sell their birds quickly. Birds are transported live on top of buses or in open pickups modified to carry three layers of birds per vehicle and, if infected with any viral disease they will be freely shedding virus along the transport route to the city of Nairobi, Kariokor or Burma markets or the municipal chicken markets in each provincial capital city.

The same vehicle that transported eggs to the market may be used to go to the hatchery to pick up day old chicks or to the shopping centre to buy chicken feed without any prior cleaning. The visits to the markets and to the restaurants are likely to result in disease agents on the farmer's clothing, shoes, egg trays and the vehicle. Trays are not decontaminated before re-use and may directly introduce disease into the poultry flocks. The trays that are retrieved from restaurants by farmers and brought home for re-use may bring disease to the farmer's flocks. The slaughter of spent hens and the disposal of offals are also likely to pose bio-security issues.

Turkey farms

✓ **Housing**

The houses are roofed with corrugated iron sheets and the upper walls are made of wire netting with the lower part made of iron sheets and cemented floors. There is a free flow of air through the houses except during brooding when sacking material is hung over the wire netting to preserve heat. The houses are very close to one another, separated by less than 20 metres. The space between the houses is planted with grass which reduces the generation and spread of dust into the houses. Feeders and drinkers are manually operated. Such equipment from the depopulated houses was still piled outside the empty houses when a visit was made to the enterprise. The equipment is cleaned on site outside the respective houses and disinfected using omnicide, a glutaraldehyde based disinfectant. Veterinary services are provided by an in-house veterinarian on a regular basis.

✓ **Waste management**

Litter is disposed of by burial or burning on the farm. Feathers and blood from the slaughter house are composted for six months mixed together with cattle manure and litter and then used as manure on the farm.

✓ **Bio-security risks at the turkey farm**

There is a disinfectant dip at the gate through which vehicles entering the farm would be decontaminated. However, the external body of the vehicles and the drivers would enter the farm without decontamination. In addition, human traffic did not seem to have decontamination facilities. Houses would be a source of bio-security breach between flock harvesting and decontamination as this does not seem to be carried out immediately. Utensils and other rearing equipment are kept in the open air outside the turkey houses after being used by birds without being cleaned as witnessed on the visit to the farm during the study period. If there had been an outbreak of Avian Influenza, litter in the houses and the unwashed equipment kept outside in the open air would spread the disease quickly to neighbouring farms. Since the houses are open to the atmosphere any airborne infectious materials could enter the flocks and infect them. Moreover, the farm houses are surrounded by a forest which is likely to have local birds and may also host migratory birds. If any of these birds were infected then they would carry the disease to the turkey farm houses readily.

It was noted that the solitary location of the farm in the forest on the slopes of a hill was intended to be a good bio-security measure since there would be minimal human traffic to the farm and the forest would act as a bio-security wall. This would have been the case if each house had been separately surrounded by trees. As it is now, all the houses are in one open space and spread of disease from one house to the other could easily occur.

Slaughtering of turkeys is done on the farm, where the waste from the slaughtering process – including the feathers – are buried. This poses a bio-security risk and potential disease spread from the farm to any other poultry establishment nearby. On the positive side, the farm uses a very effective disinfectant for decontaminating the hatchery and flock house operations and they observe strict vetting of persons entering the farm.

In the case of an Avian Influenza outbreak, decontamination and disposal of birds by burial or burning can be carried out comfortably on the farm since the farm is large and secluded from other poultry farms.

Ostrich farm

On the Maasai Ostrich Farm, migratory and resident wild birds may land on open spaces in the premises in search of food and water and could introduce disease in this way. Other bio-security risks could come from external visitors, equipment used and outside visits by workers should they go to infected premises.

Bio-security in Sector 4

Housing on indigenous poultry farms

In most areas of Kenya, indigenous chickens are kept in a separate house which is located very near to the main house for security purposes. In some communities the chicken are kept in the family house during the night. Where housing is provided, the houses are elevated above the ground and have the floor and walls made of wood planks and roofs of

grass thatch. Some more advanced ones may have iron sheets for the roofs. In other places, the houses are not elevated and here the floor is earth with mud walls and thatched roofs. Some of the elevated houses are made of intertwined thin sticks for the flooring and walls. They are usually elevated a metre or so above the ground to avoid predators. Other chicken houses are made by simply surrounding the lower part of the granary with chicken wire leaving a door for the chicken to enter. Most of the chicken houses described here have small doors and at times only young children may be able to enter through the doors, making it difficult for adults to clean the inside of them (see Annex V).

In summary there are bio-security breaches in the following areas of sector four

- Growing period - Housing and source of birds
- Social visits
- Open compounds - close contact with humans, other birds and wild animals
- Marketing and transport
- Slaughter - wet and dry feathers
- Contacts - wild birds and animals

See Section 4.4 for bio-security issues relating to slaughter.

Chapter 7

Current policies, legal framework

This information has not yet been sourced.

Chapter 8

Analysis

8.1 CURRENT STRENGTHS AND WEAKNESSES OF THE POULTRY SECTOR

The following conclusions were made from the review:

- All four poultry sectors were represented in Kenya.
- Poultry feeds were available and the quality is generally good.
- Only one farm could be classified as Sector 1; it had adequate sanitary bio-security measures but it still had some bio-security flaws to be dealt with.
- There was only one turkey farm and one duck farm in Kenya both placed in Sector 2.
- Ostriches were farmed as an emerging livestock and only one farm had a big thriving business.
- The different sectors had differing protocols for disease control.
- Bio-security flaws are present in all sectors and different strategies are needed to deal with these flaws in each of the sectors.
- Marketing is not organized into a cooperative which inhibits full access to poultry markets.
- Both the marketing and the slaughtering processes have many bio-security flaws which could lead to the spread of avian influenza.
- One slaughterhouse for indigenous chickens was introduced following the avian influenza scare as a means to control the spread of avian influenza through marketing of live birds. By processing birds at the source and selling packaged poultry products in a controlled manner the traffic of live birds going to the capital city would be reduced.
- Training and public education on safe poultry production and bio-security measures is needed to reduce spread of disease in poultry and to reduce potential human exposure to H5N1 HPAI for farmers in sectors three and four.

The following recommendations are made from the observations in the review:

- Improvement in husbandry methods in all sectors is needed so as to ensure safe poultry products for human consumption.
- A study on public education and training in safe poultry production and good bio-security in the rural setting is needed and the training needs should be met as soon as possible.
- Training in bio-security in Sectors 3 and 4 should be done urgently.
- Measures to reduce the possible spread of disease through marketing and slaughter must be taken.
- A more detailed study of poultry marketing and its impact on livelihoods should be carried out.
- Sanitation protocols are needed at the slaughtering houses and in sector four operations.
- Compensation proposals should consider the disparate losses likely to be experienced by farmers in the different sectors.
- Comparisons of sector activities and trans-boundary collaboration between countries would add value to any control plans and control activities in any one country.

- A proper poultry census should be carried out once every ten years so that planning is not being based on estimates of poultry. This can be coupled to the regular ten-year human census done in the country. Financing of an immediate census would therefore be very welcome.

8.2 PROSPECTS OF THE POULTRY SECTOR OVER THE NEXT FIVE YEARS

TABLE 19:
Production and demand projections for poultry meat and eggs (2004-2010)

		2004	2005	2006	2007	2008	2009	2010
Poultry Meat (Tonnes)	Production	23,196	23,784	24,371	24,908	25,604	26,244	26,900
	Demand	23,021	23,637	24,252	24,912	25,570	26,209	26,864
	Surplus	175	147	118	76	34	35	36
Eggs (millions)	Production	1,136	1,171	1,205	1,242	1,278	1,315	1,342
	Demand	1,010	1,040	1,070	1,104	1,138	1,171	1,240
	Surplus	126	131	135	138	140	144	152

Source: Ministry of Livestock and Fisheries Development annual report, 2004

Annex I

Who is who (contact list)

This information has not yet been sourced.

Annex II

List of major projects – poultry sector

GOVERNMENT SUPPORT PROGRAMMES FOR THE POULTRY INDUSTRY

- a) The Avian Influenza Preparedness National Task Force funded by the Government of Kenya, USAID, FAO, and DFID.
- b) National Agricultural Extension Programme (NALEP) funded by the Swedish International Development Agency (SIDA).
- c) Early Detection, Prevention and Control of Avian Influenza in Kenya funded by DFID
- d) The Government has since independence considered poultry as an important aspect of farming and essential part of household livelihoods and therefore appointed extension officers to assist farmers in their operations. There is a livestock production officer down to the district and division level.
- e) Strengthening of Agricultural Training Centers (ATCs), formerly the Farmers' Training Centers (FTC) funded by the Government of Kenya.
- f) The cockerel and pullet exchange programme of the 1970's and 90's used the FTCs to train in poultry farmers. It was supported by the Netherlands Government and was then referred to as the National Poultry Development Programme (NPDP).
- g) The Kenya Agricultural Research Institute (KARI) supports research in poultry diseases at Muguga Research Centre. There is extensive research in breeding, productivity, feed requirements, housing and hatchability for indigenous chickens at the Naivasha National Poultry Research Station.
- h) The Agricultural Sector Programme Support (ASPS) funded by the Danish International Development Agency (DANIDA) has supported a poultry improvement programme in four ASAL districts of Kitui, Kilifi, Kwale and Taita Taveta. The programme has facilitated the creation of a very good marketing structure for indigenous poultry including the only two rural slaughter houses in Kenya specifically dealing with indigenous chickens. The activities for one of these slaughter houses (The Makueni Styles Limited slaughter house) are described elsewhere in this report.
- i) Other nongovernmental organizations support poultry production as part of improving the health of rural communities and alleviating poverty for rural households, e.g. World Vision International, CARE International and Oxfam.

Annex III

Role of poultry in household food security

Agriculture supports 80% of Kenya's population with the sector providing raw materials to the manufacturing sector and a ready market for the service sector.

The agricultural sector - which is dominated by the smallholder - formed 37% of GDP in the early years of independence but this slowly declined to about 25% by 2001 where the livestock sector contributed 10% of the total GDP.

Poultry production is a major source of livelihoods for many Kenyans. In a recent study of smallholder families in Kenya, farmers ranked poultry keeping as the most important household occupation affecting their livelihoods in several ways (Kimani, et al, 2006.). Poultry eggs and meat were used for home consumption where they contributed much to the family nutrition. Income from the sale of eggs and live birds was used to obtain inputs for crops and to purchase replacement livestock as well as animal health products for the other livestock. Income from sale of manure was also put into crops thus adding great value to household food security. When poultry eggs and meat are consumed at home, the legume and grain protein sources can be sold to bring in more income into the household.

Chicken are livestock that are easier and cheaper to start rearing than other types of livestock which require a large capital outlay. This is particularly so in the rural areas where chickens scavenge for food during the day and only need some shelter for the night to escape predators. This is therefore a low input high return enterprise for the farmer and anything that would impact adversely on the chickens would immediately and directly affect the livelihoods of the farmer. Thus, any disease outbreak, drought or predators that may reduce the number of chickens in a homestead directly impacts on the food security of the farmer. Therefore, removing poultry from the home livestock creates great vulnerability, and food insecurity for the home and the community.

In the household study carried out by Kimani et al, (2006) farmers in sectors 3 and 4 were asked to give the enterprises that they were engaged in and then rank them according to the economic satisfaction the farmer got from each enterprise. The farmers listed poultry as the most important enterprise, followed by crops, sheep and goats, cattle, employment, pigs, rabbits and bee keeping in that order. Thus, poultry seemed to provide the highest economic satisfaction to the households in all the districts surveyed indicating that poultry played a very significant part in their livelihoods.

Poultry not only play a significant role in food security for farmers and rural communities but also for urban dwellers. Here while some urban dwellers consume the usual poultry cuts, others use the legs, heads and intestines to contribute to food security.

In this regard, an understanding of the structure, production systems and marketing of poultry in Kenya would help planners to assist farmers in developing sustainable livelihood options at the farm level and along the food chain all the way up to the final consumer of poultry products. This became evident during the recent avian influenza scare when the supply of poultry into the market declined and people reduced consumption of poultry and products for fear of contracting disease. Many families that could afford to changed to alternative sources of protein like fish or beef which are very expensive. Those who could not afford had to do without animal protein source in their diets for a period of six to eight months.

Annex IV

Data on cockerel exchange programme

Farms in different districts of Kenya where poultry were placed during the cockerel exchange programme that ended in 1994 and the subsequent genetic dilution using poultry population of year 2004.

WESTERN PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 bird numbers
Bungoma	RIR	566	292	625	917	701,900
Busia	RIR	299	575	548	1063	292,300
Kakamega	RIR	164	506	270	776	397,574
Vihiga	RIR	26	240	----	240	392,043
Total		1055	1553	1443	2996	1,783,817 (0.17%)
NYANZA PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 bird numbers
Homa Bay	RIR	99	---	312	312	440,600
Siaya	RIR	200	234	381	615	547,200
Migori	RIR	152	484	276	760	1,650,000
Kisumu	RIR	562	629	629	1258	288,000
Kisii	RIR	344	572	324	986	400,100
Total		1357	1919	1922	3841	1,675,900 (0.23 %)
RIFT VALLEY PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 bird numbers
Bomet	RIR	306	281	287	571	318,000
Kericho	RIR	304	235	300	535	521,600
Elgeyo Marakwet	RIR	332	300	300	600	410,900
West Pokot	RIR+BI Sh	668	321	663	984	453,500
Trans Nzoia	RIR	234	220	245	465	513,000
Total		1845	1357	1195	3135	2,217,000 (0.14%)
EASTERN PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 bird numbers
Embu	RIR+BI Sh	257	303	690	993	83,300
Kitui	RIR	509	736	700	1436	520,700
Meru	RIR	429	410	286	696	434,200
Machakos	RIR	24	303	---	303	936,100
Tharaka Nithi	BI Sh	489	---	911	911	205,900
Makueni	RIR	243	---	353	353	668,400
Total		1951	1752	2940	4692	2,180,200 (0.22%)

CENTRAL PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 birds numbers
Kiambu	RIR	754	526	714	1240	189,500
Nyeri	RIR	410	375	1020	1395	300,040
Total		1164	561	1734	2635	489,540 (0.54%)
COAST PROVINCE						
District	Breed	Farmers	Pullets	Cockerel	Total birds	2004 bird numbers
Kwale	RIR	326	258	310	578	391,500
Lamu	RIR	630	620	655	1331	149,200
Taita Taveta	RIR	881	181	855	1016	293,400
Total		1837	1059	1820	2925	834,100 (0.35%)
OVER ALL-TOTAL		9208	8200	11,654	20,224	9,180,557 (0.22%*)

Source: Project report, National Poultry Development Programme (ArieHakkesteegt, 1994).

Note: * = Overall genetic dilution of the foreign genes introduced through the exchange programme in the indigenous chickens was 0.22% by year 2004.

The greatest number of both cockerels and pullets were placed in Eastern, Western, Rift valley and Nyanza provinces in that order. Due to the prolonged exposure of the indigenous chicken to exotic genetic resources, the birds in these areas may have retained some residual blood from the exotic genes. However, the genetic dilution varies from one province to another.

Summary of the cockerel – pullet exchange placements in farms in different provinces (as of year 1993) and the ranks of genetic dilution as of year 2004 poultry population

Province	Farmers	Pullets	Cockerel	Total	Rank of totals	Genetic Dilution (%)
Nyanza	1055	1553	1443	2996	4	0.23
Western	1357	1919	1922	3841	2	0.17
Rift Valley	1844	1357	1795	3135	3	0.14
Eastern	1951	1751	2940	4692	1	0.22
Central	1164	561	1734	2635	6	0.54
Coast	1837	1059	1820	2925	5	0.35
Total	9208	8200	11,654	20,224		

Source: Project report, National Poultry Development Programme (Arie Hakkesteegt, 1994).

Annex V

Pictures

1) Bio-security at Sector 1 operations



A= Trays on the left and fumigation (arrows) Chamber on the right at the gate



B= undercarriage spray nozzles before the entry gate



C= Quarantine warning at the



D= Delivery lorry being sprayed on right side



E= Vehicle in D above being sprayed on opposite side



F= Hatchery gate locked

Showing sector 1 bio-security operations: Under-carriage spray facility (A, B); Quarantine warning sign(C); Vehicle being sprayed and a secured gate (D, E, F) illustrate good isolation, traffic control and sanitation principles of bio-security at the Kenchic main hatchery. Note the fumigation chambers for the trays located at the gate and the under-carriage vehicle spray nozzles just inside the outer gate.

2) Housing of indigenous chicken



A=Wooden sided



B= Horizontal wood planks



C=Twisted twines on the sides



D= Elevated with twisted Twigs on the sides.



E=Granary-mud walled sides



F= Granary with wire Netting.

Illustrating the different types of chicken houses in sector four where indigenous chickens are kept. Notice the various construction materials and the difficulties in cleaning and decontaminating these houses. Disease can easily spread from one bird to another in such houses.

3) Transportation of indigenous birds by handcart (A) and bicycle (B) and transport of spent hens by vehicle (C) to retail markets.



A



B



C

4) Stages in the slaughtering of indigenous chickens at a municipal slaughter house, Thika



A= Birds in cages



B= Birds ready for defeathering



C= Washing defeathered bird



D= Inspected birds; note the stamp mark



E= Inspected birds packaged in plastic bags



F= Offals awaiting disposal

Annex VI

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Annex VII

Maps

No maps available.