

The Contribution Of Urban And Peri Urban Livestock Farming In Nairobi County, Kenya

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ABSTRACT: Survey to study the contribution of livestock production to the livelihoods of urban and peri urban residents was conducted in Nairobi County. Structured questionnaires and focus group discussions were used to obtain information from interviewees sourced by random sampling of 40 households to represent the entire County. Sampling was done in Embakasi, Kasarani, Kamukunji and Lang'ata sub-counties; Data were analysed using SPSS. The results showed house holds size ranged between (1 – 10) individuals, majority (57.5%) of respondents, household heads. The age of most respondents (47.0%) ranged from (36 – 50) years. Fifty percent attained secondary school. Majority (87.5%) was married and (75.0%) had no official employment, thus farmers. Livestock species kept by respondents were poultry (67.5%), goats (30.0%), cattle (25.0%), rabbit (22.5%), pigs (7.5%), and sheep (5.0%). Breeds preferred by respondents were (45.0%) indigenous chicken, (15.0%) exotic chicken, (5.0%) kept both, (22.5%) exotic cattle, (20.0%) exotic goats, (15%) exotic rabbits while (5.0%) rabbit crossbreeds. Rabbit and poultry meat was produced most in Kamukunji. Embakasi produced 54 trays average indigenous chicken egg per month. Lang'ata produced exotic chicken egg, average 14 trays per month. The estimated values of goats were highest at Kamukunji; mean of KSh. 20, 500.00, while pigs were mean KSh. 6000.00 in Kasarani. Milk production was highest in Kasarani with mean monthly cattle milk production of 474.00 liters; Kasarani and Kamukunji each produced a mean of 30 liters of goat milk. Most respondents (40.0%) sold their produce at farmgate; major challenge was lack of feeds at 87.5% and lack of extension services at 77.5%. In conclusion livestock production in Nairobi County may not support the entire population but provides fresh protein and income/employment to the farmers. The government can improve provision of extension services and feed accessibility for maximum production in Nairobi County.

Key words: Contribution of livestock, urban and peri urban agriculture, Nairobi County, Kenya

I. INTRODUCTION

Urban Peri Urban Agriculture (UPA) is the practice of agricultural production and related enterprises (both crops and livestock) within the cities and the environs reflecting varying levels of animal husbandry, aquaculture, agro forestry, urban beekeeping and horticulture (8, 4). It is an important activity as it contributes to the livelihood options of the poor and middle income earners. By 2050 the UN estimates that the global population will reach 9.6 billion, majority of which in urban areas of the less developed regions. Sub Saharan Africa in particular will constitute a great portion (5). The rapid expansion of urban populations puts direct pressure on food sources creating high competition for the available scarce resources, creating challenges in supplying enough nutritious and safe food thus scarcity and food insecurity. Alternative methods of food production are on the rise with the need to cope and be food secure. Urban livestock keeping will be among the choices which will contribute largely to the urban peri urban livelihoods.

Urban livestock production supplies the domestic requirements of meat, eggs, milk and dairy products, and other livestock products while contributing to the 30% of the total marketed agricultural products (MOLD Sessional paper No.2 of 2008). Access to urban's ready market for agricultural produce and available labor opens

up livestock farming in urban centres for commercial purposes. Rural dwellers migrating into urban areas bring with them agricultural practices for food security and livelihoods reasons (15). Urban populations have an overall poverty incidence of 49% and chronic food insecurity of 38%, (5), (10). Proper agricultural production technologies, policies and regulation need to be set in place so as to promote the necessary avenues of addressing food scarcity and food insecurity. Urban food security is becoming a matter of increasing concern as urban poverty is reflected in the nutritional status of the people similarly impoverished urban households are estimated to spend 60-80% of income on food(2).

Results of a comprehensive survey urban household survey carried out by (9) in 6 Kenyan cities showed that 17% of the respondents kept Livestock. The estimated 1.4 m heads of livestock kept in all Kenyan towns at the time of the survey were worth 17M USD. Despite the initiatives to address Agricultural production, urban peri urban livestock contribution has remained relatively unaccounted for. Research or information on urban livestock production has remained low too. The need for information and calls to understand the contribution of urban livestock keeping in addressing unemployment, rapid urbanization and population growth to the livelihoods of the urban keepers need to be considered in driving the sector to growing economies of the urban livestock producers.

With the role of agricultural production towards food security our research sought to understand the contribution of urban peri urban livestock production to the residents in Nairobi County. The aim of the study was to determine the contribution of urban livestock farming to the livelihoods of the residents in Nairobi County and identify the marketing strategies used by livestock farmers and also evaluate the investment inputs in terms of feed used and housing structures employed. Understanding the contribution of livestock production will guide in making decisive conclusions on the need for continuity or investment in this sector. We focused on understanding the marketing strategies employed by these producers to ensure their product reached the consumer in the best of its state of production. This was necessary to understanding the impact of livestock farming in urban areas. The main focus of the study was on Livestock farmers.

II. MATERIALS AND METHODS

Sampling and data analysis

Four sub-counties namely: Kasarani, Embakasi, Lang'ata and Kamukunji were selected for sampling. Eight staffs in the Livestock department were recruited to assist in data collection and thus guide the researchers around the area since the officers worked in these regions and thus understood the areas and the farmers therein. The eight were trained in conjunction with the department of Livestock production (Nairobi County). Programmes in data collection tools were taught and participants were guided on how to apply the data collection tool. This was to ensure the right questions were asked and the right information obtained and recorded appropriately. This led to the final development of the questionnaire applied for data collection. Purposeful sampling targeting livestock keepers and a combination of questionnaires and stakeholder meetings (Focused Group Discussions) were used to obtain the information required. Secondary data was used to supplement primary data.

Another tool was developed to collect information from a focused group discussion which incorporated representatives from self-help groups, Community based organizations and Non-governmental organizations involved in urban agricultural production and where it was possible those directly linked to urban livestock keepers in the region.

A common venue was selected at Buruburu Tabernacle in conjunction with the Agriculture sector development programme and department of livestock production Nairobi County. Five participants from the four study sites were invited for a forum and data collection tool 2 was used as a guide to ask questions in line with the objectives of the study. A total of 40 questionnaires were used in this study; making a sample size of 40 households. This adjustment was made to get a good precision although even a sample size of 30 households would still give good results (17). Units were obtained through simple random sampling whereby households were randomly selected from the sub-Counties (12).

The survey data was analyzed using SPSS software, after coding the data and entering the data on excel sheet, descriptive statistics including mean, frequencies, maximum, minimum values and range were produced. Covariance factors were also analysed.

RESULTS

The distribution of socio-economic factors that influence livestock production in Nairobi County

Most families had 4 – 10 individuals and 57.5% of which, household heads. In terms of gender, 45.05% were males and 55.0% females. Majority were aged between 36 - 50 years at 47.0% (19 farmers) while those above 50 years at 30.0% (12 farmers), 18 – 35 years old at 20.0% (8 farmers). One farmer was under 18 years old. Most farmers had basic secondary education at 50.0% (20 farmers), 27.5% (11 farmers) attained primary education and 22.5% (9 farmers) attained post-secondary education. Thirty five farmers (87.5%) were married while three farmers (7.5%) were single and two farmers (5%) widows. 30 farmers (75.0%) had no other employment, 5 farmers (12.5%) employed, 2 farmers (5%) retired and 3 farmers (7.5%) business people.

Table 1: The distribution of socio-economic factors that influence livestock production in Nairobi County

Parameter (n=40)	Description	Number of respondents	Percentage
Household size	1 -3	12	30.0
	4-6	23	57.5
	7-10	5	12.5
Gender	Male	18	45.0
	Female	22	55.0
Age of respondents (years)	< 18	1	2.5
	18-35	8	20.0
	36-50	19	47.5
	> 50	12	30.0
Marital status	Single	3	7.5
	Married	35	87.5
	widowed	2	5.0
Employment	Yes	5	12.5
	No	35	87.5

The species of livestock kept by farmers in Nairobi County

Table 2 shows the types of livestock kept by the respondents in Nairobi County, Majority kept chicken (67.5%), 30.0% goats, 25.0% cattle, 22.5% rabbits, 7.5% pigs and 5% sheep. Most respondents kept poultry largely because of the low space demand and the fact that household refuse and small amounts of compounded feeds are adequate to sustain the birds. In terms of the households involved, goats and cattle come next in terms of respondents keeping them. Cattle were raised in zero grazing units so as to utilize on open spaces of small sizes and market left over's complemented with commercial feeds.

Table 2: Types of livestock kept by respondents in Nairobi County

Type of animals kept	Number of respondents	Percentage
Cattle	10	25.0
Pigs	3	7.5
Rabbits	9	22.5
Poultry	27	67.5
Goats	12	30.0
Sheep	2	5.0

Breeds of animals kept by respondents in Nairobi County

Majority, 18 respondents (*Fig. 1*); kept indigenous chicken breeds, 6 kept exotic rabbits and poultry breeds while 2 farmers kept cross-breeds, 8 kept exotic goat breeds and 3 exotic pig breeds. Indigenous poultry breeds were kept by most respondents to supply the demand for healthier inorganic produce believed to be better than that of chemical use for control of diseases and more produce within a short period.

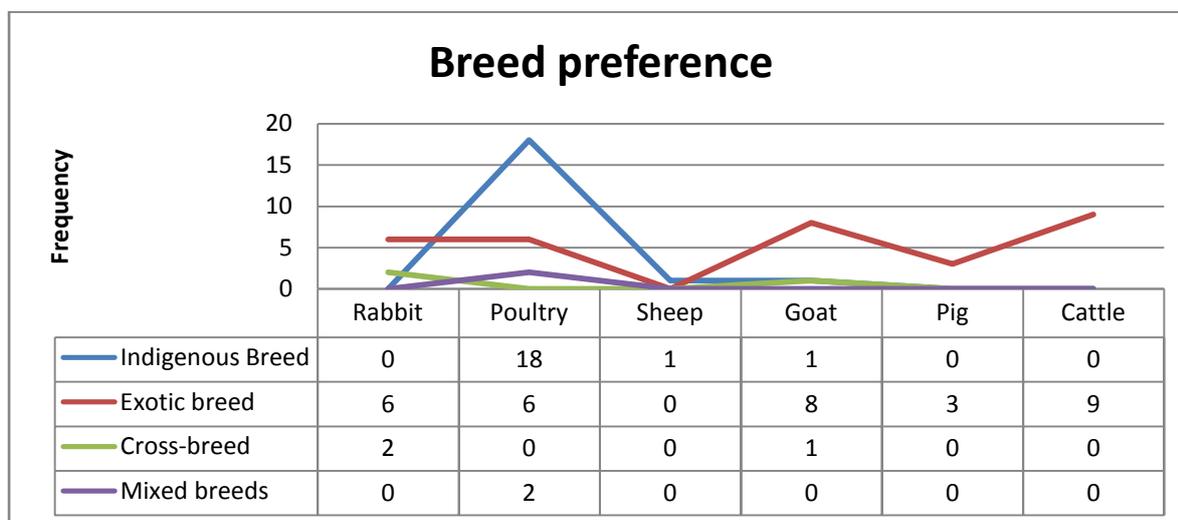


Figure 1: The frequency of farmers breed preference in Nairobi County

The rabbit meat produced and sold in one month, and the prices per kg

Monthly rabbit meat production was highest in Kamukunji at an average of 4.70 kg with some producing as high as 45 kg per month. The average amount sold was 5.00 kg with a maximum sale of 42 kg per month; the selling price was KSh. 400 in Embakasi and Kamukunji (*Table 3*).

Table 3: Rabbit meat produced and sold in one month and their prices per kg

Sub-County	Produced (kg/household)	Sold (kg/household)	Selling price (sh/kg)

	Mean	Min	Max	Mean	Min	Max	Min	Max
Embakasi (n = 16)	1.00	0	10	0.88	0	8	400	400
Kasarani (n = 5)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Kamkunji (n = 10)	4.70	0	45	5.0	0	42	400	400
Lang'ata (n = 9)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

NIL – None of the respondents kept rabbit, n – sample size

The poultry meat produced and sold in one month and price per kg

Most chicken meat was produced in Kamkunji at average of 14.70 kg and a maximum of 144 kg. The average amount sold was 14.68 kg with some respondents selling up to 140.8 kg; the selling price ranged between KSh. 300.00 and KSh. 400.00. Embakasi was second at an average of 4.00 kg and a maximum of 28 kg. The average amount sold was 2.50 kg with some selling up to 24 kg; the selling price ranged between KSh. 400 and KSh. 500, (Table 4).

Table 4: Poultry meat produced and sold in one month and price per kg

Sub-County	Produced (kg/household)			Sold (kg/household)			Selling price (sh/kg)	
	Mean	Min	Max	Mean	Min	Max	Min	Max
Embakasi (n = 16)	4.00	0	28	2.50	0	24	400	500
Kasarani (n = 5)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Kamkunji (n = 10)	14.70	0	144	14.68	0	140.8	300	400
Lang'ata (n = 9)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

NIL – None of the respondents kept poultry, n – sample size

Indigenous chicken egg produced and sold per month and the average price per tray

Table 5 Indigenous chicken egg production per month was highest in Embakasi, mean of 54 trays with some respondents producing as high as 600 trays. Mean average of 25 trays and a maximum of 390 trays of eggs were sold; the price ranged from KSh.300 to KSh.450.00 per tray. Lang'ata followed at a mean production of 3 trays with some farmers producing upto15 trays eggs, the price ranged from KSh.300 to KSh. 600 per tray. Kamkunji had a mean of 2 trays of eggs and a maximum of 10 trays of eggs, the amount that was sold was an average of 1 tray of eggs and a maximum of 9 trays of eggs.

Table 5: Indigenous chicken eggs produced and sold per month and the average price per tray

Sub-County	Produced (tray/household)			Sold (tray/household)			Selling price (sh/tray)	
	Mean	Min	Max	Mean	Min	Max	Min	Max

Embakasi (n = 16)	54	0	600	25	0	390	300	450.00
Kasarani (n = 5)	NIL							
Kamkunji(n = 10)	2	0	10	2	0	9	150	600
Lang'ata (n = 9)	3	0	15	1	0	2	300	600

NIL –None of the farmers in Kasarani kept poultry, n– sample size

Layers chicken egg produced and sold per month and the average price per tray

Table 6 indicates that layer egg production per month was highest in Lang'ata at a mean of 14 trays of eggs with some farmers producing up to 120 trays of eggs, the average amount that was sold was 14 trays of eggs and the maximum number sold was 120 trays of eggs ; the price of the eggs were KSh. 300 per tray while Embakasi followed at a mean of 1 tray of eggs and a maximum production of 15 trays of eggs, the amount that was sold was an average of 1 tray of eggs and a maximum of 13 trays of eggs; the selling price was KSh.300.00 per tray. Kasarani had a mean of 1 tray of eggs with some farmers producing up to 10 trays of eggs, the amount that was sold was an average of 1 tray of egg and a maximum of 3 trays of eggs; the price was KSh.285 per tray and Embakasi had a mean of 1 tray egg and a maximum of 15 trays eggs, the amount that was sold was an average of 1 tray of eggs and a maximum of 13 trays of eggs; the price was KSh.300 per tray.

Table 6: Layers chicken eggs produced per month and the average price per tray

Sub-County	Produced (tray/household)			Sold (tray/household)			Selling price (sh/tray)	
	Mean	Min	Max	Mean	Min	Max	Min	Max
Embakasi (n = 16)	1	0	15	1	0	13	300	300
Kasarani (n = 5)	1	0	10	6	0	3	285	285
Kamkunji (n = 10)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Lang'ata (n = 9)	14	0	120	14	0	120	300	300

NIL – None of the respondents kept layers, n – sample size

The estimated monthly values of rabbits, poultry, sheep, goat, pigs and cattle in Embakasi, Kasarani, Kamkunji and Lang'ata sub-Counties

In *Table 7*, it is shown that rabbit production was highest in Kamkunji at an estimated mean value of KSh. 6, 270.00 with highest earner getting KSh. 30, 000 followed by Lang'ata at an estimated mean value of KSh. 3, 555.60 with the highest earner getting KSh. 16, 000. Embakasi was third at an estimated mean value of KSh. 1, 937.50 while the farmer who was getting the highest amount of money earned KSh. 16, 000. There was an estimated mean value of rabbit of KSh. 600.00 and the best earner getting a maximum of KSh. 3, 000. Poultry production was highest in Kasarani at an estimated mean value of KSh. 81, 000.00 and a maximum value of KSh. 315, 000 followed by Kamkunji at an estimated mean value of KSh. 24, 960.00 with a maximum of KSh. 120, 000. Lang'ata was third at an estimated mean value of KSh. 5, 300.00 with a maximum estimated value of KSh. 23, 000. Sheep production was only done in Kamkunji with an estimated mean value of KSh. 2000.00 with the farmer getting the highest amount of money at KSh. 20, 000. Goat production was done in three Sub-Counties: Embakasi, Kasarani and Kamkunji. The highest production was recorded in Kamkunji at an estimated mean value of KSh. 20, 500.00 and a maximum value of KSh. 175, 000, Kasarani was second at an estimated mean value of KSh. 10, 000.00 with a maximum of KSh. 30, 000 while Embakasi had an estimated mean value of KSh. 6, 812.50 and a maximum of KSh. 30, 000. There was pig production in Kasarani at an estimated mean value of KSh. 6, 000.00 and an estimated maximum value of KSh. 30, 000 and Kamkunji at an estimated mean value of KSh. 3, 500.00 with an estimated maximum value of KSh. 35, 000. Cattle production was highest in Kasarani at an estimated mean value of KSh. 3, 500, 001.20 with an estimated maximum value of KSh. 1, 650, 000 from some farmers. There was an estimated mean value of KSh. 46, 875.00

and an estimated maximum value of KSh. 50, 000 in Embakasi, and an estimated mean value of KSh. 3, 500 with an estimated maximum value of KSh. 35, 000 in Kamkunji.

Table 7: The estimated monthly values of rabbits, poultry, sheep, goats, pigs and cattle in Embakasi, Kasarani Kamkunji and Lang'ata sub-counties

Estimated values							
Sub-County		Rabbit	Poultry	Sheep	Goat	Pig	Cattle
Embakasi	n ¹	16	16	16	16	16	16
	Min	0	0	0	0	0	0
	Max	16000	20000	0	30000	0	50000
	Mean	1937.5	4508.8	0	6812.5	0	46875.0
Kasarani	n ¹	5	5	5	5	5	5
	Min	0	0	0	0	0	0
	Max	3000	315000	0	30000	30000	1650000
	Mean	600.0	81000.0	0	10000.0	6000.4	350001
Kamkunji	n ¹	10	10	10	10	10	10
	Min	0	0	0	0	0	0
	Max	30000	120000	20000	175000	35000	35000
	Mean	6270.0	24960.0	2000	20500.0	3500.0	13000.0
Lang'ata	n ¹	9	9	9	9	9	9
	Min	0	0	0	0	0	0
	Max	16000	23000	0	0	0	0
	Mean	3555.6	5300.0	0	0	0	0

n – Sample size

The average amount of milk produced in one month in Embakasi, Kasarani, Kamkunji and Lang'ata sub-Counties

The monthly cattle milk production was highest in Kasarani at an average of 474.00 liters with the best producer having a maximum of 1350 liters followed by Embakasi at an average of 273.80 liters with a maximum of 1500 liters and Kamkunji was third at average of 54.00 liters and a maximum of 450 liters. There was no cattle milk production in Lang'ata Sub-County. Goat milk production in Kasarani was equal at a monthly average of 30 .00 liters while there was an estimated average amount of 10.00 liters in Embakasi. There was no goat milk production in Lang'ata and no sheep milk produced in the four Sub-Counties (*Table 8*).

Table 8: The average amount of milk produced in one month in Embakasi, Kasarani, Kamkunji and Lang'ata sub-counties

Sub-County		Cattle milk produced per month	Goat milk produced per month
Embakasi	Min	0	0
	Max	1500	75
	Range	1500	75
	Mean	273.80	10.00
Kasarani	Min	0	0
	Max	1350	90
	Range	1350	90
	Mean	474.00	30.00

Kamukunji	Min	0	0
	Max	450	30
	Range	450	30
	Mean	54.00	30.00
Lang'ata	Min	NIL	NIL
	Max	NIL	NIL
	Range	0	0
	Mean	0.00	0.00

NIL – the interviewed respondents did not keep milk producing animals

The major methods used by farmers to house livestock in Nairobi County

(Table 9, Fig. 2, Fig. 3, Fig. 4 and Fig.5) shows the major types of housing were semi-permanent houses. (65.0%) used this type of housing; (22.5%) used permanent houses for the animals and (2.5%) used temporary houses. The livestock production systems included zero grazing for cattle, deep litter system for poultry and rabbit hutches.

Table 9: The major methods used by farmers to house livestock in Nairobi County

Types of housing structures		
	Frequency	Percentage
Not indicated	3	7.5
Permanent	9	22.5
Semi-permanent	26	65.0
Temporary	1	2.5
None	1	2.5



Figure 2: Temporary cattle house holding a herd of cattle in one of the farms in Kasarani sub-count



Figure 3: Rabbit hutch holding rabbits in one of the farms in Lang'ata sub-county



Figure 4: Permanent cattle house holding cattle in one of the farms in Embakasi sub-county



Figure 5: Deep litter system holding chicken in one of the farms in Kamkunji sub-county

The extension services received by farmers in Nairobi County

In *Table 10*, thirty farmers (75.0%) had been visited by extension service officers and 67.5% of these farmers were Government of Kenya extension service officers. Twenty three farmers (57.5%) did not respond to the type of training they have got from these officers; 4 farmers (10.0%) attained training on poultry housing; 3 farmers (7.5%) received dairy cattle management skills. Other farmers received training on: cow milk value chain, group dynamics, rabbit production husbandry, dairy goat management and table banking

Table 10: The extension services received by farmers in Nairobi County

Received extension services		
	Frequency	Percentage
Yes	30	75.0
No response	1	2.5
No	9	22.5
Type of extension services		
	Frequency	Percentage
No response	13	32.5
Government of Kenya	27	67.5
Types of training attended		
	Frequency	Percentage
No response	23	57.5
Poultry housing	4	10.0
At show ground	1	2.5
Cow milk value chain	1	2.5
Group dynamics	1	2.5
Rabbit production husbandry	1	2.5
Dairy cattle management	3	7.5
Rabbit and dairy goat management	2	5.0
Dairy cattle and dairy goat management	2	5.0
Table banking	2	5.0

4.17: The marketing strategies applied by farmers in Nairobi County

Most farmers (40.0%) sold their produce at the gate, (15.0%) sold either at the gate or delivered to the market. (10.0%) delivered directly to the market; another (10.0%) had specific order delivery and other (10.0%) did not

respond. (5.0%) used roadside stores while other two farmers (5.0%) used three strategies by selling at the gate, delivering to the market or had specific order delivery. One farmer either sold at the gate or used roadside store (*Table 11*).

Table 11: The marketing strategies used by farmers in Nairobi County

Marketing strategies		
	Frequency	Percentage
No response	4	10.0
Sell at the gate	16	40.0
Deliver to the market	4	10.0
Roadside store	2	5.0
Specific order delivery	4	10.0
Sell at gate and deliver to market	6	15.0
Sell at gate and roadside store	1	2.5
Sell at gate, deliver to market and specific order delivery	2	5.0

4.18: The major production challenges faced by farmers in Nairobi County

Table 12 indicates the major challenge was lack of feeds as 87.5% of the farmers stated this was the main problem followed by lack of extension services at 77.55; environmental management problem at 67.5%; lack of market information at 65%; disturbance by the County council by-laws at 52.55 and lack of access to market at 45.0%. Other challenges include diseases, veterinary services and high feed price.

Table 12: The major challenges faced by farmers in Nairobi County

Percentage Production challenges						
	Lack of market access	Environmental management	Lack of market information	Disturbance by County council by-laws	Lack of feeds	Lack of extension services
No response	15	5	7.5	15	5	10
Least important	40	27.5	27.5	32.5	7.5	12.5
Most important	45	67.5	65.0	52.5	87.5	77.5

DISCUSSION

6.1 The distribution of socio-economic factors that influence livestock production in Nairobi County

The family size ranged between (1 – 10) individuals in Nairobi County (*Table 1*). This means that livestock production supports large family sizes. Similar results were recorded by (12) who found that goat production in the agro-pastoral regions supported family size of between (2-10) individuals which also means that there is no difference in family size between the rural and urban centers.

Majority of the respondents in the County were females at 22 farmers (55%) and 18 farmers (45%) were males. This means females associate themselves with livestock production than the male family members. Different from (12) who noted that in the agro-pastoral regions in the Arid and semi-arid lands of Kajiado and Makueni Counties, the male family members associated themselves with livestock production than the females. This difference is caused by the fact that in the urban centers there is a lot of official jobs and other businesses and so majorly women were left at home to take care of the animals.

6.2 The types of livestock kept by farmers in Nairobi County

Poultry was the most dominant type of livestock kept in the urban and peri urban areas of Nairobi (*Table 2*); 65% of the farmers kept poultry as opposed to other livestock breeds. This is because poultry needed little space to raise. This result is similar to results by (11) who also noted that poultry farming was the major livestock production in the peri urban centers in Botswana. Among the ruminant species goat production was dominant as 30% of the farmers kept goats while 25% of the farmers kept cattle and only 5% of the farmers kept sheep. This result is different from result by (7) who noted that the peri urban areas of Nigeria was dominated by cattle as 77% of the farmers kept cattle, 15% kept sheep and 8 % kept sheep. (6) Reported that in the urban areas small stocks (poultry, sheep, and pigs) were dominant but dairying was also common among cities. A small percentage of the farmers who engaged more on livestock production had their family members in official jobs. Only 5 people (12.5%) of the total number of people who were interviewee had their family members in official jobs; 2 (5%) were retired (*Table 1*). This means that most of the people who practice in livestock production in Nairobi County consider it as a job and a major source of income. Sumberg (1996a) also noted the same low percentage in Dar-es-salaam and Mwanza in Tanzania. He reported that 14% of those who practiced livestock farming in Dar-es-salaam and 12% in Mwanza had official jobs.

6.3 Farmers' breed preference in Nairobi County

Farmers preferred keeping different breeds of livestock in the same farm (*Fig. 1*) and even different breeds of a particular type of animal. Example for the farmers who kept poultry ; 18 farmers kept indigenous poultry breeds, 6 farmers kept exotic breeds and 2 farmers kept mixed indigenous and exotic breeds. Nine farmers kept exotic cattle animals while 8 farmers kept exotic goats. The reason for this was to reduce the chances of being affected by calamity such as diseases, not all the chicken or animals will be killed in case of an outbreak. A gain majority of the farmers kept indigenous chicken breeds which are known to be tolerant to diseases. Another reason was to maximize on production and profit while reducing cost. Similar results were recorded by (13) who noted that farmers West African Cities owned more than one species of livestock. They stated that 87.8% of households across Ouagadougou (Burkina Faso) owned more than one livestock species. They recorded that sheep were the most frequent species in this city, followed by chick at 69.0%, cattle and goats were 61.4% each.

6.4 The value of livestock in Nairobi County

The value of livestock was one of the key reasons for keeping these animals (*Table 7*). Farmers earned good money from the animal kept. Example the mean monthly value of cattle was KSh 3,500,001 and some of the farmers earned KSh 1, 650, 000 per month in Kasarani. The mean value of poultry in the same sub-county was 81, 000 and a one of the farmers earned KSh 315,000 per month. These results are clear evidence that livestock keeping can be a very good source of income in the urban and peri urban areas of Nairobi County. (6) also reported that farmers in urban areas can earn up to KSh. 100,000 per month by just 3000 doves or 50 breeding sows. (3) reported a very low profit for the Ugandan urban and peri urban areas. He noted that poultry

production system run by one family consisted of 400 layers in an urban setting in Kampala, Uganda. Its distance to the next closest human living area was less than 50 meters. Profitability was estimated at average 700 Ugx (0.3 USD) per month when spread out throughout the life of the hen. Layers were kept from October 2012 to Sept 2013 and sold at 10,000 Ugx (3,9 USD) which is equivalent to KSh. 333.33 a conversion rate of KSh. 1 at 30 Ugandan shilling at the end of the production period.

Mean monthly cattle production of milk was: 273.00 liters in Embakasi sub-County, 474.00 liters in Kasarani sub-County, 54.00 liters in Kamkunji sub-County (**Table 8**). A similar result was recorded by Nkya in Morogoro urban where the average monthly milk production small holder dairy cattle was 308 liters \pm 6 liters for those animal that are kept under zero grazing and 258 liters \pm 36 liters for those animals that are partially grazed, (16)

6.6 Livestock housing methods in Nairobi County

Most farmers (65%) used semi- permanent method of housing, 22.5% of the farmers used permanent (**Table 9**). The major production systems were zero-grazing for cattle, deep liter system for chicken and cages for rabbits. This was meant to protect the animals from cold weather of Nairobi County and also from roaming anyhow within the urban region. This might create conflicts.(1) recorded a different scenario where there was poor housing of livestock in Morogoro urban in Tanzania. The animals walked anyhow and caused pollution and conflict in the urban center.

6.7 Livestock production challenges in Nairobi County

The major problem in livestock production in UPA areas of Nairobi was lack of extension services. This means most farmers are not taught on the best ways to keep livestock in the UPA regions of Nairobi. This ignorance is one of the causes of low livestock production in Nairobi County and its environs. A percentage of (77.5%) said that extension services were a problem. The same results were also recorded by (11) who found that extension services and training was only confined to the rural areas or commercial farmers in Botswana. There were no urban agricultural officers or urban agricultural demonstrators to support the farmers in the urban centers. Another major threat to livestock production in the Nairobi County was poor environmental management; (67.5%) of the farmers said this was a concern. This is because there is a lot of disposal of organophosphates; these are fed on by the livestock that are later on consumed by human (food chain). The organophosphates are known to be one of the causes of cancer. This is a major life threat. (11) also noted that environmental problems were a major concern the urban and peri urban centers of Botswana. He added that the major threats to human life and the environment from agricultural in urban and peri-urban areas came from careless use of agricultural inputs such as fertilizers, pesticides, fumigants and herbicides. Marketing of livestock and their products was not a major problem (**Table 12**) as it was recorded as most important challenge at only 45%. This is because of the large population in the urban center of Nairobi and so there is increase in food demands. This is different from results by (11) who noted that in Botswana marketing is sometimes difficult as people do not shop from informal sources and so many people prefer shopping from supermarkets (92%). He showed that 71% of the people living in the urban do not get food from informal sources.

CONCLUSION AND RECOMMENDATION

1. There is a lot of cattle production in the urban and peri-urban areas of Nairobi County. The production is not enough to feed the whole population because there is a very high human population size in Nairobi urban area though it subsidises and improves protein consumption in the capital city of Kenya. What should be done by the government of Kenya is to improve the provision of extension services. This will enable the farmers to be trained on the best livestock management methods around the town and also how to maximize on production to feed a greater population than it does now.

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APPENDICES

Appendix 1: Questionnaire

Background/General information

1. Sub County.....

2. Division.....
3. Ward/Location.....
4. Name of Respondent.....
5. Is the farmer the head of household? Answer with Yes or No
6. What is the Gender of the farmer?
 Male.....
 Female.....
7. What is the Age of Respondent? (Tick where appropriate)
 Under 18yrs.....
 18-35yrs
 36-50yrs.....
 Over 50 years.....
8. What is the Level of Education of respondent?
 None.....
 Primary level.....
 Secondary level
 Post secondary level.....
 Other, specify.....
9. What is the size of the household (number of family members)?.....
10. What is the marital status of the farmer?
 Single
 Married
 Widow
 Widower
11. Is the respondent employed? Yes No
12. What is the ownership of the farm?
 Own property
 Rental property
 Others (specify).....
- 12(b) What is the size of the farm in acreages?.....
13. Do you keep any of these domestic animals in the farm? (tick the ones kept)
 Pigs
 Cattle
 Rabbits
 Poultry
 Goats
 Sheep
 Others, specify.....

14. If yes in any of the above; show breed, number kept and their estimated values?

	Animal type	Breed	Number		Estimated Value
			Males	Females	
1	Rabbits				
2	Poultry				
3	Sheep				

4	Goats				
5	Pigs				
6	Cattle				
	Estimated Total value				

15. How much milk did you get from the named enterprises in the previous year in Kshs?

		Milk produced in Liters			Amount consumed in Liters			Amount sold in Liters			Selling Price per Liter
		Per day	Per month	Annual	Per day	Per month	Annual	Per day	Per month	Annual	
1.	Cattle										
2.	Goats										
3.	Sheep										
4.	Others specify										

16. How much meat did you get from the named enterprises, amount consumed and sold?

		Meat produced in Kg			Amount consumed			Amount sold			Selling Price per KG
		Per day	Per month	Annual	Per day	Per month	Annual	Per day	Per month	Annual	
1	Cattle										
2	Goats										
3	Sheep										
4	Rabbits										
5	Poultry										
6	Pigs										
7	Other specify										

17. How many eggs were produced from the poultry enterprises kept this year, sold and consumed?

		No. of eggs produced in trays			Amount consumed in trays			Amount sold in trays			Selling Price per tray/egg
		Per day	Per month	Annual	Per day	Per month	Annual	Per day	Per month	Annual	
1.	Indigenous chicken										
2.	Layers										
3.	Quails										

4.	Goose										
5.	Others, specify										

18. What are challenges faced in urban peri urban livestock production? rate from 1 to 5 where, 1-Most Important, 3-Average Importance and 5-Least Importance

Access to the markets(Distance)	
Environmental management-waste, ventilation, noise	
Lack of market information	
Disturbances by the city council bylaws	
Lack of feeds for livestock/accessibility	
Lack of extension services	
Others, specify	

19. How do you market (marketing Strategies) your produce? Tick where appropriate

Sell at the gate-farm gate	
Deliver to the farmers market	
Road side stores	
Hawking	
Specific order and delivery	
Others, specify.....	

20. Did any extension staff visit your farm within the last one month? Yes No
 GOK NGO CHURCH
 Others (specify).....
 Are they trained?

21. Are you a member of any farmers group? Yes No
 22. Have you received any group trainings within the last year? Yes No
 If Yes give details of the training.....

23. In your area how many kilometers(Estimate) are you based away from the main market? 0-5Km
 6-10Km 11-20KM

24. Are there any cottage industries-(preservation) that do value addition in order to increase the shelf life of raw farm products? Yes. No.

25. If Yes above, are you involved in any value addition of your products, please give details on products, amount value added and the sales made

Product	Kg	Selling Price of raw product@Kg	Amount value added in Kg	Selling Price of value added product@Kg
Meat				
Eggs				
Milk				
Skin				
Fur				
Honey				
Others,specify				

26. What has been the major benefits in urban peri urban livestock farming, rate them from highest (1 TO REPRESENT THE MOST BENEFICIAL and 10 THE LEAST IMPORTANT).

Creates employment	
Source of fresh food products	
Biogas production	
Compositing for manure	
Creates income for the family	
Others, Specify	

27. Name the housing systems found in the farm (Tick where appropriate)

- ZERO GRAZING-
- DEEP LITTER-
- RABBIT CAGES-
- COW SHEDS-
- STORES-
- OTHERS SPECIFY

28. What is the housing structure found on the farm like? Tick where appropriate

- PERMANENT-
- NONE-
- SEMI PERMANENT-
- SPECIFY OTHERS

29. Identify the feed resources as identified by the farmer and the conservation methods used and tick where appropriate. Indicate where there is No conservation.

Feed resource	Conservation method
Homemade feed rations	
Commercial	
Crop by products	
Napier and Grasses	
Legumes	
Others, specify	