

Livestock and Livelihoods in Urban Niger

**By Luca Tasciotti, SOAS University of London
and Ugo Pica-Ciamarr, FAO**

This paper will measure the magnitude played by livestock activities in urban Niger to determine which are the main socioeconomic determinants for keeping livestock in urban environments. Almost 40 percent of the households in urban Niger keep livestock, mainly as a source of additional income; urban households are more likely to keep small ruminants and poultry rather than large ruminants, as land and feed are not easily available in urban areas. Poorer households are more likely to rear livestock than the better-off ones, even though wealthy dwellers keep a higher number of animals; male-headed households tend to have a higher number of animals than female-headed ones. Keeping livestock significantly contributes to the livelihood of poor households as it represents an additional and significance source of income, hence playing a major role when facing unexpected expenses. Both descriptive and empirical tests show that keeping livestock does not constitute a source of animal food in the household's nutrition. Understanding the role that livestock activities play in the urban context is important for local governments and development organizations to better tailor define and address livestock related policies.

Introduction

The African continent is in the midst of significant demographic, economic, technological, environmental and socio-political transitions. Urbanization is an underlying component of this change: in 2011 52 African cities exceeded one million inhabitants and the global share of African urban dwellers is projected to rise from 11.3 percent in 2010 to 20.2 percent in 2050, i.e., from 400 million to 1.26 billion (1). Rapid urbanization is associated with a variety of

challenges, from employment through public health and from environmental to food security issues. Urban and peri-urban agriculture i.e. both crop and livestock activities provides opportunities to address some of those challenges by generating employment at the farm level and along the value chain. Urban agriculture will also provide fresh food for self-consumption and urban markets, and will contribute to greener cities (2).

Within urban and peri-urban agriculture, livestock farming plays an important role: a cross-country analysis of nationally representative datasets from 12 developing countries reports that between five and 33 percent of rural households depend on livestock for their livelihoods (3). Another study finds that in Tanzania about 22 percent of urban households keep some animals (4) whereas another report finds that about 37 percent of urban households keep animals in Niger (5).

The literature on livestock-keeping in rural areas includes two major strands. Some papers portray the varieties of urban livestock production systems while other studies address specific issues along the livestock value chain, such as feed and animal health constraints. This paper, meanwhile, aims to understanding the role of livestock in urban and peri-urban areas by assessing the magnitude of this phenomenon in the urban context and by measuring how it contributes to the livelihoods of urban dwellers. The analysis was carried out using the Niger National Survey on Living Conditions and Agriculture (*Enquête Nationale sur les Conditions de Vie des Ménages et Agriculture* - ECVM/A 2011) which has been implemented by the Government of Niger and constitutes a living standards measurement survey, representative for both rural and urban areas and with a specific focus on agriculture, including livestock. This current paper can be considered innovative in two respects: it builds on a dataset which is representative of the urban population and targets the livestock and

livelihoods equation. The literature on livestock in urban areas very often relies on datasets that do not claim to be representative for urban areas and tends to focus on specific livestock production systems issues, such as food safety or environmental degradation, without exploring the livestock-livelihood nexus (6; 7; 8; 9).

The next section reviews the literature on livestock farming in urban areas. While the third section introduces the main features of the data used in the analysis; descriptive statistics and econometric results are respectively in Section 4 and 5. Conclusions and policy implication of this paper will follow in Section 6.

Livestock Keeping in Rural Areas: A Review

Urban and peri-urban households keep farm animals for a variety of reasons. Livestock contribute to food security, income and employment generation, savings, insurance and social status. Animals can be easily converted into cash to cover major or unexpected expenditures, such as school and medical fees. Livestock keeping requires less land than crop agriculture, or no land at all for some production systems, and, as such, it is compatible with the growing demand for land for housing. Urban livestock can be fed on household waste, weeds and grass from public parks and roadside hedges and on crop residues from markets and urban agriculture, thereby generating value out of resources which would otherwise remain unexploited. There is also scattered evidence that vulnerable groups, such as female headed households, children, widows and people with little education, are often engaged in urban and peri-urban livestock keeping (10; 11). Urbanization is associated with an increased demand for animal protein, including meat, milk, eggs and other livestock products. These factors

provide opportunities for poor urban and peri-urban livestock keepers to derive additional benefits from their animals, including the limited possibilities of exiting poverty.

Urban and peri-urban livestock keeping is also characterized by weaknesses and constraints. Livestock compete for water resources with humans and, due to limited land and feed availability, is usually associated with small-ruminant such as goats and sheep and other activities such as poultry keeping (chicken, ducks and rabbits), which are on a small scale do not significantly contribute to livelihoods. As well, about 70 percent of emerging human diseases are of animal origin, and animal health in urban areas is often poor due to inadequate husbandry practices, which generate major public health risks. Animal waste disposal exacerbates the human waste disposal problem and can contribute to environmental degradation.

A first strand of the literature describes and/or classifies urban and peri-urban livestock production systems (12; 13). Maeen-ud-Din and Babar provides a detailed description of livestock farming in the peri-urban areas of Faisalabad, Pakistan (14). Their study differentiates farmers by herd structure and land owned, it looks at the milk production and sale and at the major production constraints -including limited availability of fodder and feed, limited access to animal health services and credit and marketing facilities. A study across three West African cities, notably Kano in Nigeria, Bobo Dioulasso in Burkina Faso and Sikasso in Mali undertook an analysis of peri-urban livestock production strategies (6). They collected data from 84, 63 and 63 households respectively and investigated feeding and marketing strategy. In another study 75 livestock-keeping households in Enugu Urban, Nigeria, had been interviewed and data on animal species kept gathered (7). Another 120 dwellers randomly chosen among all those livestock keepers living in Kampala city parishes

were interviewed. The study investigated major constraints to livestock productivity, of which feed was found as the most important (8).

A second strand of the literature looks at specific elements along the livestock value chain. For example, there are pieces of research looking at the feeding strategy adopted by farmers who deal with feed scarcity in Kampala, Uganda (8). These researches looked at changing of feed resources based on availability and cost, purchasing of feed ingredients in bulk, using crop/food wastes, harvesting of forages growing naturally in open access lands and reducing herd size. An investigation carried out in India aimed at drawing conclusions about livestock-driven human health issues, with a focus on zoonosis, contaminated water as well as occupation health hazards (15) while a related analysis aims at assessing the quality and safety of meat products in the urban markets of Ibadan, Nigeria (16). The demand for milk quantity and health safety issues has been studied in urban China (17) as well as the level of *Staphylococcus* contamination of informally marketed milk and milk collection centers in Debre-Zeit, Ethiopia (18).

Data

This paper builds on data from the Survey on Living Conditions of Households and Agriculture (ECVM/A) collected by the National Institute of Statistics of Niger between June and December 2011. The ECVM/A has a specific focus on agriculture. The survey is nationally representative at the urban/rural and agro-climatic zone level. The sample includes of 3,265 households, of which 1,202 are urban and 2,063 rural. The survey tools included a household, agricultural and community questionnaire.

The ECVM/A includes an expanded module on livestock.¹ Information was collected for livestock ownership by species, both indigenous and improved breeds and production and husbandry practices –e.g. breeding, housing, feeding, watering, vaccination and deworming. Additional data was gathered about production of tradable outputs as well as non-tradable or marginally traded livestock products, such as dung and hauling services.

Explorative Livestock Data Analysis

Characteristics of Livestock Keepers

Out of the 1,202 households living in urban areas of Niger, 34 percent or 408 households reported to keep one or more animals. The representative urban livestock-keeping household (Table 1, column 2) comprises seven members; the household head is 50 years old and in three-fourth of cases have little or no formal education. In these cases, urban agriculture, including crop and livestock, is the main economic activity; as well one-fourth of livestock-keeping households own some land.

Table 1: Household characteristics

	Livestock keeping households	Non livestock keeping households	H0: Xdo = Xpa p-values
<i>Household characteristics</i>			
Household size	7.2 (3.6)	5.5 (3.1)	0.02**
Share of women in working age	39.5 (55.2)	42.7 (56.3)	0.54
Age of the head of the household	49.6 (14.0)	45.0 (12.9)	0.71
Share of female headed households	14.2 (35.0)	17.0 (0.3)	0.28
Share of head of hh. not having any educ.	59.2 (49.1)	46.6 (49.9)	0.05**
Share of head of hh. having primary educ.	15.9 (36.6)	19.5 (39.6)	0.09**
<i>Household head main occupation</i>			
Agriculture (crop and livestock)	31.9 (44.1)	18.2 (24.1)	0.02**
Industry	12.6 (33.2)	15.1 (35.8)	0.23
Trade	16.5 (37.2)	22.7 (41.9)	0.8*

¹ For further information on the survey, please refer to <http://microdata.worldbank.org/index.php/catalog/2050>, lastly accessed on August 2015.

Transport	7.14 (25.7)	6.87 (25.3)	0.68
Education	5.8 (23.5)	6.12 (23.9)	0.31
Other	25.9 (24.3)	31.0 (38.4)	0.09*
<i>Main mode of transportation</i>			
Walking	84.6 (41.9)	86.3 (25.2)	0.32
Bike	0.5 (7.1)	0.4 (0.6)	0.25
Motorcycle	3.8 (18.2)	2.3 (15.0)	0.36
Car	6.1 (23.1)	3.5 (18.4)	0.10*
Other	5.0 (8.9)	7.5 (8.6)	0.8*
<i>Agricultural lands</i>			
Household owns land	26.5 (42.5)	27.5 (26.3)	0.51
Size of the land (in square meters)	4,801 (17,912)	1,168 (17,912)	0.07**
Distance between the dwelling and the land (in km)	2.4 (5.3)	4.9 (6.3)	0.10*
<i>Household income</i>			
Log. of household income	13.8 (1.2)	13.78 (1.2)	0.56
Household income	2,341,954 (1,470,000)	2,122,867 (2,270,033)	0.25
Number of observation	408	794	

Source: Survey of Living Conditions of Households and Agriculture (2011).

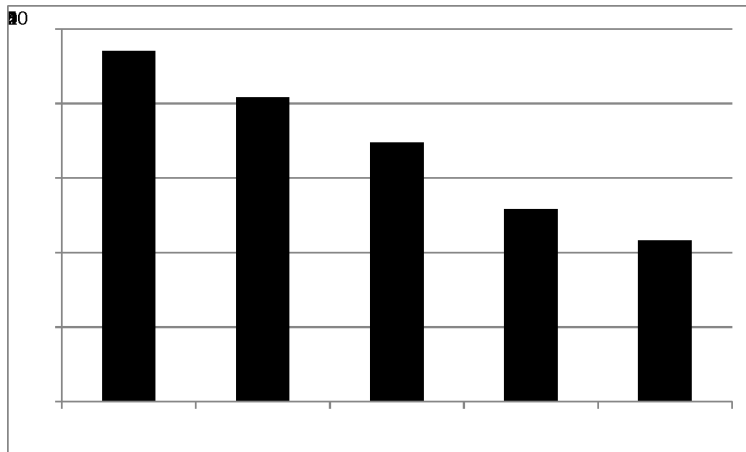
Note: The figure does not differentiate among the amount of livestock owned. *, **, *** significant at 10%, 5% and 1%.

There are significant differences between livestock-keeping and non-livestock keeping urban households. The former tend to be larger than the latter, most likely as raising animals require labour. They are likely to keep larger land parcels and closer to the homestead, and finally, they are more likely to be engaged in agriculture and less educated.

Livestock-keeping households are slightly better off than non-livestock keeping households even though the difference is not significant which suggests that, at least in urban areas, animal rearing may be correlated with the endowments the household has. This finding clashes with the share of urban dwellers keeping livestock, which, in fact, decreases with the wealth of the household (Figure 1). This last finding is more consistent with the evidence of the existing body of literature: a comprehensive study carried out using a sample of 12

developing countries finds that between 22 and 26 percent of the less wealthy do keep livestock compared to 8 and 12 percent of the better-off (3). In some cases, however, the very poor might not keep animal as they lack even the resources to purchase livestock, with their day-to-day livelihood depending almost completely on providing casual labor (20).

Figure 1: Share of urban households keeping livestock, by expenditure quintiles



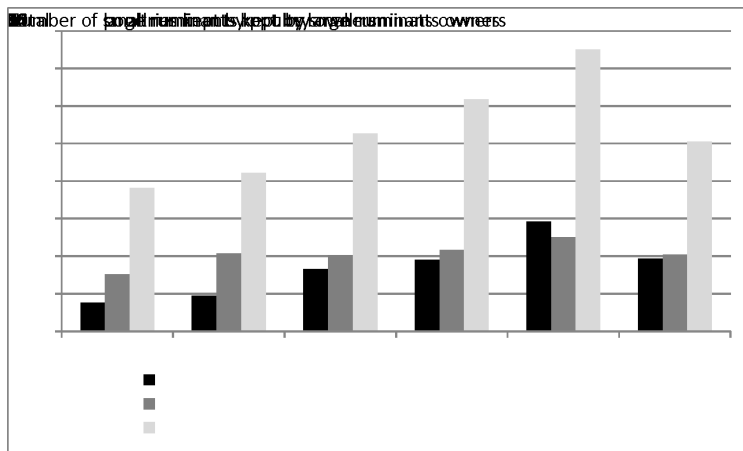
Source: Survey of Living Conditions of Households and Agriculture (2011).

Urban Herds and Flocks

Small ruminants dominate among the livestock species kept in urban areas, with about 28 percent of urban households keeping one or more sheep and/or goats. About 13 percent of urban households keep poultry, largely chicken, and seven percent keep large ruminants, namely cattle. The average herd comprised of four large ruminants, four small ruminants and ten birds; the median herd size is smaller and is comprised of two large ruminants, three small ruminants and seven birds. This is suggestive of an unequal distribution of livestock assets: households in the fourth and fifth expenditure quintile keep in fact about 55 percent of all livestock in urban Niger. In any case, herds are never particularly large: households in the top expenditure quintile keep six cattle, four sheep and/or goats and slightly more than a dozen

birds (Figure 2). This indicates that keeping livestock in urban areas is rarely a major business or a major income source for households.

Figure 2: Number of livestock owned, by livestock keeper and by expenditure quintile in urban Niger



Source: Survey of Living Conditions of Households and Agriculture (2011).

Not only herd size but also herd composition varies with wealth. Poorer households mainly keep small ruminants and poultry, while those in the top expenditure quintile are more likely to own cattle (Figure 3 and Table 2).

Figure 3: Total household income and type of animals owned: urban Niger



Source: Survey of Living Conditions of Households and Agriculture (2011).

Note: The size of the bubbles is proportional to the number of households-keeping the referred livestock type.

Table 2: Share of urban households keeping different typologies of livestock, by expenditure quintiles

Typology	Expenditure quintiles					Average
	Lowest	2 nd	3 rd	4 th	Highest	
Large ruminants	2.33	5.33	7.85	9.00	8.15	6.56
Small ruminants	42.16	34.74	26.92	18.76	16.93	28.08
Poultry and small animals	14.08	16.24	15.62	10.72	6.79	12.72

Notes: All urban households are included in the statistics.

Source: Survey of Living Conditions of Households and Agriculture (2011).

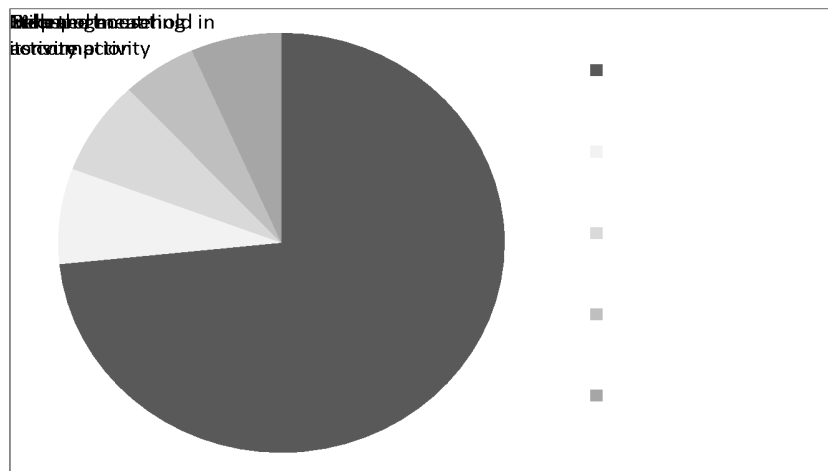
This is consistent with the theory of the livestock ladder, which suggests that the poorest households mainly keep poultry, the slightly less poor also keeping small ruminants and/or pigs, and only the more affluent, in relative terms, keep large ruminants. In general, however, households diversify and keep animals of different species in order to take advantage of the diverse, often complementary, roles each species can play in reducing the households' vulnerability and enhancing resilience.

Income from Livestock

ECMA sampled households have to indicate the major reason for keeping livestock. Income generation ranks first for 73 percent of livestock keeping households; the rest keep

animals for food, transport services and for supporting other households activities (e.g. provision of fuel) (Figure 4).

Figure 4: Main reason for keeping livestock among urban households living in Niger

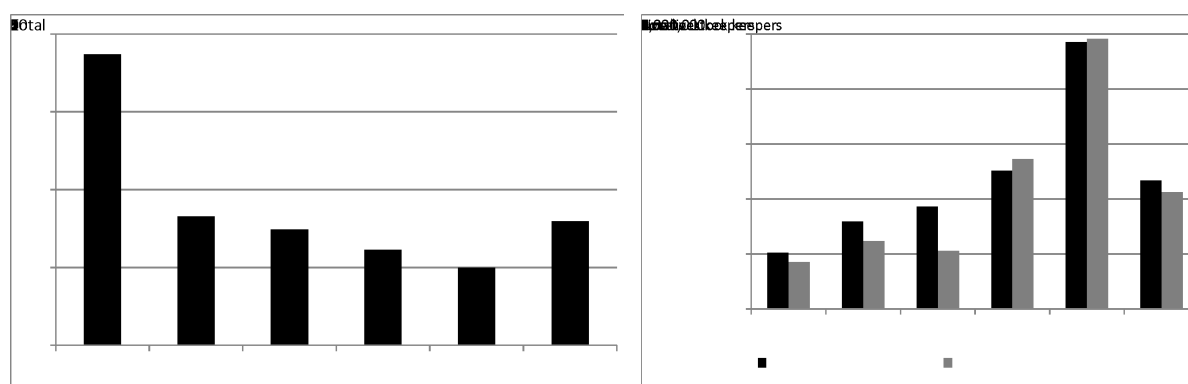


Source: Survey of Living Conditions of Households and Agriculture (2011).

Note: The figure does not differentiate households owning different quantities of livestock.

Livestock is a major livelihood supporting asset for the very poor, at least in terms of its contribution to annual income as measured by the sum of agricultural wage, income from crop and livestock activities, and non-agricultural wage, which include salaries from independent jobs, transfers and other (5). The left histogram of Figure 6 shows that households in the bottom quintile derive almost 40 percent of their cash income from livestock. Households from the second to the top expenditure quintile derive between 20 and 10 percent of their income from livestock. An interesting result, presented in the right histogram of Figure 5, is that, within the same expenditure quintile, households keeping livestock in the first three quintiles have a slightly larger income than non-livestock keeping households.

Figure 5: Share of income from livestock by expenditure quintile (left) and total household income (CFCA) per year by expenditure quintile (right) and by urban household keeper/non keeper



Source: Survey of Living Conditions of Households and Agriculture (2011).

Note: Only urban households have been considered in the statistic of the histogram on the left, and only urban livestock keeping households have been considered in the statistic of the histogram on the right.

Food from Livestock

In rural areas, where markets are imperfect and animal proteins are not readily available to purchase, livestock keeping is often positively associated with the consumption of animal source foods (11; 20). The ECVMA Niger data, however, shows that this correlation does not hold for urban households (Table 3 and Figure 6): indeed, the difference between the share of livestock and non-livestock-keepers consuming and purchasing meat, dairy products and eggs is negligible and apart for the consumption of eggs not statistically significant in urban Niger.

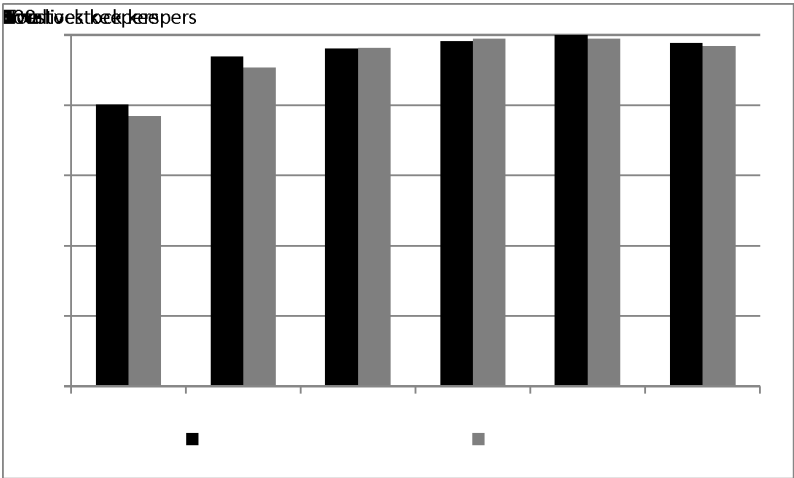
Table 3: Share of urban households consuming livestock products, by household keeper/non keeper and by expenditure quintile

Expenditure quintiles	Meat		Dairy		Eggs	
	Livestock keepers	NON livestock keepers	Livestock keepers	NON livestock keepers	Livestock keepers	NON livestock keepers
1	66.6	66.2	60.0	56.2	8.0	4.3
2	84.9	83.1	80.4	69.8	17.5	11.8
3	94.9	85.2	85.4	81.5	18.8	11.6
4	97.7	92.8	90.9	80.9	27.0	26.2
5	99.3	97.4	96.3	94.3	54.6	50.5
Tot	90.7	85.0	84.6	80.6	22.2	14.9

Source: Survey of Living Conditions of Households and Agriculture (2011).

Results in Figure 6 are consistent with the literature on the impact of urban crop and livestock agriculture on a household’s dietary diversity score, which finds insignificant causality between agricultural assets and nutritional status in urban areas (21).

Figure 6: Share of urban households purchasing livestock products, by household keepers/non keepers and by expenditure quintiles



Source: Survey of Living Conditions of Households and Agriculture (2011).

Multivariate Livestock Data Analysis

Methods

This section explores correlations between livestock keeping in urban areas and (i) household demographic and socio-economic characteristics, (ii) household income and (iii) household consumption of animal-source foods. The objective is to identify potential

correlates of livestock ownership, with a particular focus on income and the consumption of animal-source foods.

Model (1) explores the determinants of livestock keeping in urban areas by regressing a number of demographic and socio-economic household variables against livestock ownership. We estimate a probit model as follows:

$$(1) L_i = a_0 + a_1 H + a_2 S_i + R_i + e_i$$

where L is a dummy variable indicating, in different regressions, whether the household keeps any livestock, large ruminants, small ruminants or poultry. The vector H includes a number of household related variables including household size, age, years of education, dummies related to educational level, and gender of the household head. The vector S includes socio-economic variables including the size of the land owned, distance of the land from the homestead or dummies for the main source of livelihoods as well as the household expenditure quintile. R is a vector of regional dummy variables that account for geographical heterogeneity and e_i is the error term.

Model (2) explores the correlation between household income and livestock assets controlling for a number of other possible income correlates. We estimate an OLS model as follows:

$$(2) X_i = a_0 + a_1 L + a_2 H_i + a_3 S + R_i + e_i$$

The dependent variable is the log annual household income, while the independent variables include livestock ownership, household demographics and socio-economic variables. L represents, in different model specifications, a simple dummy for livestock ownership; a dummy variable for three different levels of herd sizes (less than 1 TLU; between 1 and 2

TLU; greater than 2 TLU); a dummy variable for the species of animals owned, including large ruminants, small ruminants and poultry. H , S and R are the same vectors as in model 1.

Model (3) investigates the existence of correlations between livestock ownership and consumption of animal-source food in urban areas. We estimate the following probit model:

$$(3) C_i = a_0 + a_1 L + a_2 H_i + a_3 S + R_i + e_i$$

The dependent variable is a dummy variable indicating whether the household consumes any animal based food in the first model specification; and any meat, dairy product or eggs in the second, third and fourth specifications respectively. The independent variables include the vectors H , S and R as in the previous models, including household demographic, socio-economic and geographical characteristics, as well as the variable L (livestock) as described for model (2) above.

Results

Tables 4, 5 and 6 present estimated parameters for selected variables of the livestock-keeping, livestock-income and animal-source-food consumption models.

As to the correlates of livestock keeping, households that keep land are more likely to keep animal, which is not surprising (21). An implication is that, as urbanization progresses and land becomes increasingly scarce, it will be more challenging for urban households to keep animals in and around cities: this could be good for the environment and public health but will force the poorer households to look for other livelihood strategies.

A second finding, which is consistent with the literature (10), is that male-headed households are more likely to keep cattle, while female-headed households are more likely to keep

poultry such chicken and other domesticated birds which can be kept easily while undertaking other household-related cores (22).

Table 4: Correlates of livestock keeping

<i>Independent variables/ Dependent variable</i>	<i>Keeping livestock</i>	<i>Keeping large ruminants</i>	<i>Keeping small ruminants</i>	<i>Keeping poultry</i>
<i>Gender head of the hh.</i>	-0.13 (0.10)	-0.53*** (0.23)	-0.07* (0.11)	0.35*** (0.02)
<i>Age head of the hh.</i>	0.01*** (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.06** (0.02)
<i>Years of educ. head of the hh.</i>	-0.00 (0.03)	-0.27 (0.23)	-0.02 (0.11)	0.03 (0.04)
<i>Land owned</i>	0.07*** (0.00)	0.05*** (0.23)	0.07*** (0.00)	0.06*** (0.00)
<i>Distance land owned</i>	-0.05** (0.01)	-0.05*** (0.00)	-0.03** (0.00)	-0.02** (0.00)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of observation</i>	1,528	1,528	1,528	1,528
<i>R-squared</i>	14.79	27.54	17.42	9.40

Source: Survey of Living Conditions of Households and Agriculture (2011).

Notes: *, **, *** significant at 10%, 5% and 1%.

Table 5 shows results for model 2 on the correlation between annual household income and livestock related assets. It shows a positive correlation regardless of how the livestock variable is specified. A notable finding is that small and medium-size herds are correlated with higher income; this finding does not apply to larger herds, those with more than two tropical livestock units, whose correlation with household income is positive, but not significant. A plausible reason is that only households in the upper quintiles tend to keep more than a few animals: for them, livestock is not a major livelihood-supporting asset and, therefore, unlikely to be associated to income level.

Table 5: Correlations between livestock and household income

<i>Independent variables/ Dependent variable</i>	<i>Log of household income</i>	<i>Log of household income</i>	<i>Log of household income</i>	<i>Log of household income</i>
<i>Keeping livestock</i>	0.82** (0.44)	NO	NO	NO

<i>Total tropical livestock</i>	NO	0.12*** (0.00)	NO	NO
<i>TLU class 0-1</i>	NO	NO	0.61* (0.31)	NO
<i>TLU class 1-2</i>	NO	NO	3.45*** (3.21)	NO
<i>TLU class >2</i>	NO	NO	9.99 (4.49)	NO
<i>Keeping large ruminants</i>	NO	NO	NO	1.40** (0.83)
<i>Keeping small ruminants</i>	NO	NO	NO	0.53* (0.28)
<i>Keeping poultry</i>	NO	NO	NO	0.97** (0.38)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of observation</i>	1,528	1,528	1,528	1,528
<i>R-squared</i>	42.16	42.46	42.17	42.11

Source: Survey of Living Conditions of Households and Agriculture (2011).

Notes: . *, **, *** significant at 10%, 5% and 1%.

Table 6 presents results for model (3), targeting correlations between livestock ownership and the consumption of animal source foods. This is an important way through which livestock can contribute to nutrition, as meat, milk and eggs are energy-dense and good sources of a number of micronutrients. For urban Niger there's no evidence of any correlation between consumption of animal source-foods and livestock ownership, with the exception of poultry ownership. There are several explanations for this result: first, in some cases, such as for small ruminants, animals are mainly kept as a buffer stock and as a form of savings rather than as a productive assets (20); second, the poor who depend heavily on domesticated animals for their livelihoods (Fig. 6) often prefer trading high-valued animal protein for low-value calories, including basic staples; third, poultry are largely kept for eggs and not meat purposes: eggs are of low value products in local markets and households rarely have

enough birds to produce a tray of eggs for sale on a daily basis, so travelling to market to sell a few eggs is not profitable.

Table 6: Assessing the influence livestock keeping activities have on the household nutrition, regression results

<i>Independent variables/ Dependent variable</i>	<i>Consumption of animal based food</i>	<i>Consumption of animal based food</i>	<i>Consumption of animal based food</i>	<i>Consumption of animal based food</i>
<i>Keeping livestock</i>	0.66 (0.55)	NO	NO	NO
<i>Total tropical livestock</i>	NO	1.66 (0.84)	NO	NO
<i>TLU class 0-1</i>	NO	NO	-0.93 (1.84)	NO
<i>TLU class 1-2</i>	NO	NO	3.76 (9.6)	NO
<i>TLU class >2</i>	NO	NO	0.69 (1.56)	NO
<i>Keeping large ruminants</i>	NO	NO	NO	0.81 (2.97)
<i>Keeping small ruminants</i>	NO	NO	NO	-0.85 (1.48)
<i>Keeping poultry</i>	NO	NO	NO	-2.91 (2.82)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of obs.</i>	1,435	1,435	1,435	1,435
<i>Pseudo R-squared</i>	27.15	27.16	27.17	27.29
<i>Independent variables/ Dependent variable</i>	<i>Consumption of meat</i>	<i>Consumption of meat</i>	<i>Consumption of meat</i>	<i>Consumption of meat</i>
<i>Keeping livestock</i>	-0.11 (0.73)	NO	NO	NO
<i>Total tropical livestock</i>	NO	1.79 (1.20)	NO	NO
<i>TLU class 0-1</i>	NO	NO	-0.60 (0.81)	NO
<i>TLU class 1-2</i>	NO	NO	1.56* (1.06)	NO
<i>TLU class >2</i>	NO	NO	0.10 (0.21)	NO

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<i>Keeping large ruminants</i>	NO	NO	NO	2.00 (2.05)
<i>Keeping small ruminants</i>	NO	NO	NO	0.30 (1.19)
<i>Keeping poultry</i>	NO	NO	NO	-3.29 (2.10)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of obs.</i>	1,435	1,435	1,435	1,435
<i>Pseudo R-squared</i>	19.77	19.87	19.93	19.98

<i>Independent variables/ Dependent variable</i>	<i>Consumption of dairy food</i>	<i>Consumption of dairy food</i>	<i>Consumption of dairy food</i>	<i>Consumption of dairy food</i>
<i>Keeping livestock</i>	0.63 (0.68)	NO	NO	NO
<i>Total tropical livestock</i>	NO	1.96* (1.01)	NO	NO
<i>TLU class 0-1</i>	NO	NO	0.50 (0.73)	NO
<i>TLU class 1-2</i>	NO	NO	3.45 (5.48)	NO
<i>TLU class >2</i>	NO	NO	0.69 (1.73)	NO
<i>Keeping large ruminants</i>	NO	NO	NO	1.16 (1.93)
<i>Keeping small ruminants</i>	NO	NO	NO	1.34 (1.05)
<i>Keeping poultry</i>	NO	NO	NO	-1.82 (1.73)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of obs.</i>	1,435	1,435	1,435	1,435
<i>Pseudo R-squared</i>		15.03	14.94	10.64

<i>Independent variables/ Dependent variable</i>	<i>Consumption of eggs</i>	<i>Consumption of eggs</i>	<i>Consumption of eggs</i>	<i>Consumption of eggs</i>
<i>Keeping livestock</i>	0.07*** (0.00)	NO	NO	NO
<i>Total TLU</i>	NO	0.09*** (0.00)	NO	NO
<i>TLU class 0-1</i>	NO	NO	0.33	NO

			(0.70)	
<i>TLU class 1-2</i>	NO	NO	5.16	NO
			(6.37)	
<i>TLU class >2</i>	NO	NO	8.19	NO
			(7.57)	
<i>Keeping poultry</i>	NO	NO	NO	1.98***
				(0.23)
<i>Regional dummies</i>	YES	YES	YES	YES
<i>Number of obs.</i>	1,435	1,435	1,435	1,435
<i>Pseudo R-squared</i>		20.79	20.77	20.67

Source: Survey of Living Conditions of Households and Agriculture (2011).

Notes: *, **, *** significant at 10%, 5% and 1%.

Conclusions and policy recommendations

The role urban agriculture crop and livestock related activities- play in Sub-Saharan countries in the context of urban dweller livelihood is crucial. The importance these activities have in terms of food provision and as source of extra income will likely to increase given the current rise in African urbanization. The contribution crop activities have on food security, household income, job creation and gender issues has been well recognized and measured, along with their environmental benefits. On the other hand, livestock keeping phenomena in urban areas has been studied less so that qualitative and quantitative evidence about its extent, magnitude, problems and potentialities is still limited.

The rise in urban livestock production is evident in a number of African countries: about 20,000 urban households in Bamako, Mali, keep livestock and thousands more supply them with inputs and other services; in Harare, Zimbabwe, more than one-third of households keep some livestock, mainly poultry and rabbits. In Dar-es-Salaam, Tanzania, 74 percent of urban farmers keep livestock and urban farming constitutes the second largest employer in the city; in Cairo, Egypt, 5 percent of households raise animals, particularly chickens and

pigeons. As the number of people living in cities grows rapidly, the share of poor households depending on informal livelihood strategies will increase, suggesting that urban livestock keeping activity will continue to expand.

This paper focuses on the contribution of livestock to household livelihoods in urban Niger, using a nationally representative datasets, notably the 2011 Survey of Living Conditions of Households and Agriculture. Previous studies on urban livestock looked mainly at specific production and husbandry practices by using datasets that did not claim to be representative for urban areas. Furthermore, previous studies did not report statistics concerning the role that the keeping of livestock has had for the livelihoods of the keepers.

Our results point out that in Niger an average of 40 percent of urban dwellers engage in livestock keeping activities for their livelihood; there are differences in the rate of participation among income groups, with a higher share of those households in the lower income quintile being engaged in livestock activities. The types of livestock kept by households in different income groups vary too; households in the bottom quintile usually keep animals of one species while the better-off are more likely to have a diversified -though small- herd. The average (median) herd comprises about 4.1 (3) goats/ sheep; 3.9 (2) cattle; and about 10.1 (7) chicken. In general, households largely keep small ruminants, preferably goats over sheep and poultry, largely chicken, as those animals are relatively easy to keep and feed. Few households keep cattle, mainly those dwellers in the higher income quintiles. The regression shows that households with available land are more likely to keep animals; male (female) headed households are more likely to keep cattle (poultry).

Our cross-sectional survey data show that urban households most highly value the possibility of cash income that may derive from keeping livestock; 72 percent of the urban

livestock keepers in Niger say that income is the number one reason for livestock activities. In percentage terms, the ways livestock activities contribute to the household income vary among different income groups. Livestock activities may generate up to 40 percent of the total income for the poorest strata of the population and between 10 and 20 percent for the rest of the households. Regressions results highlight that there is a clear correlation between livestock ownership and income level, regardless of how livestock are measured. Keeping large ruminants seems to have the larger impact on the household income, even though all types of livestock have a positive correlation with the income.

Several studies have pointed out that urban livestock keeping activity may represent an important contribution to the protein needs of urban population. However this paper shows that both descriptive statistics and regression results point out the fact that there is no significant correlation between livestock ownership and consumption of animal-source foods. The role that livestock keeping activities may have on food security has to be studied from a different perspective, with a focus on the indirect ways livestock activities may affect food security. Livestock activities represent a buffer for the households and enable them to cope with economic shocks such as declining wages, family unemployment, price increases of staple goods and changes in available cash due to diverse other sources. Furthermore, the reason for keeping livestock can be explained by the fact that raising animals allows households to sell higher value goods such as eggs, meat and milk so that cash can be used to supplement household income, pay for schooling fees, doctors expenses and for several other purposes.

The potential that urban livestock may have in terms of food security seems not to be fully exploited. There are systemic reasons including the lack of appropriate laws to regulate land

tenure and property rights, the structure of urban food market, plus waste disposal and credit access that make practicing urban livestock problematic. This topic must be addressed in development agendas so that increased benefits can be realized. It is worth mentioning, though, that negative livestock keeping related spillovers –i.e. environmental contamination, zoonoses and lack of products’ safety- represent a serious threat for the sustainable development of this activity.

Notes

1. UN HABITAT, *The state of African cities 23014: re-imagining sustainable urban Transitions* (Nairobi, Kenya: United Nations Human Settlements Programme, 2014).
2. Redwood, M., *Urban agriculture and changing food markets. The Global Food Crisis: Governance Challenges and Opportunities* (Wilfrid Laurier University Press, Waterloo, Canada 2009), 205-215.
3. Pica-Ciamarra, U., Tasciotti, L., Otte, J., and Zezza, A., “Livestock in the Household Economy: Cross-Country Evidence from Microeconomic Data”, *Development Policy Review*, vol. 33 (1) (2015): 61-81.
4. Covarrubias, K., Longin, N. and Zezza, A., “*Livestock and livelihoods in rural Tanzania. A descriptive analysis of the 2009 National Panel Survey*” (Unpublished manuscript, 2012).
5. Bocoum, I., Dury, S., Egg, J., Herrera, J., and Prevel, Y. M.. “Does monetary poverty reflect caloric intake?”, *Food security*, vol. 6(1) (2014): 113-130.
6. Amadou, H., Dossa, L. H., Lompo, D. J. P., Abdulkadir, A., and Schlecht, E., “A comparison between urban livestock production strategies in Burkina Faso, Mali and

- Nigeria in West Africa”, *Tropical animal health and production*, vol. 44(7) (2012): 1631-1642.
7. Asadu, A. N., Igbokwe, E. M., Chah, J. M., and Enwelu, I. A., “Health and Environmental Hazards Posed by Urban Livestock Keeping in Enugu Urban, Nigeria: Implication for Climate Change Mitigation”, *Journal of Agricultural Extension*, vol. 16(2) (2013): 14-23.
 8. Katongole, C. B., Nambi-Kasozi, J., Lumu, R., Bareeba, F., Presto, M., Ivarsson, E., and Lindberg, J. E., “Strategies for coping with feed scarcity among urban and peri-urban livestock farmers in Kampala, Uganda”, *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, vol. 113(2) (2013): 165-174.
 9. Mwajombe, K. K., and Mlozi, M. R., “Agriculture in Tanzanian Towns: The Policy Implications. Measuring Farm-level Technical Efficiency of Urban World”, *Journal of Social Science*, vol. 2 (1) (2015): 62-80.
 10. Richards, J.I. and Godfrey, S.H., “Urban livestock keeping in sub-Saharan Africa”, *Report of a workshop held on 3-5 March 2003 in Nairobi, Kenya* (Natural Resources International Ltd, Aylesford, Kent, UK 2003).
 11. Guendel, S. and Richards, W., “Peri-urban and urban livestock keeping in East Africa-a coping strategy for the poor”, *Scoping study commissioned by DFID. Natural Resources Institute: Aylesford* (2002).
 12. Rossler R., Mpouam S.E., Muchemwa T., Schlecht E., “Classification of Urban and Peri-Urban Livestock Farm Types in Ouagadougou and Tamale”, Paper presented at Tropentag, September 16-18 (2015), Berlin, Germany.

13. Thys, E., Ouedraogo, M., Speybroeck, N. and Geerts, S., “Socio-economic determinants of urban household livestock keeping in semi-arid Western Africa”, *Journal of Arid Environments*, vol. 63(2) (2005): 475-496.
14. Moaen-ud-Din, M., & Babar, M., *Livestock farming in peri-urban areas of Faisalabad*, Pakistan. *Young*, 65 (2006) 11-13.
15. Singh B.B., Ghatak S., Banga H.S., Gill J.P.S and Singh B., “Veterinary Urban Hygiene: A Challenge for India”, *Rev. sci. tech. Off. int. Epiz.*, 32(3) (2013): 645-656.
16. Grace, D., Olowoye, J., Dipeolu, M., Odebode, S., & Randolph, T. (2012). “The influence of gender and group membership on food safety: The case of meat sellers in Bodija market, Ibadan, Nigeria”, *Tropical animal health and production*, vol. 44(1) (2012), 53-59.
17. Cheng L. and Changbin Y., “Demand for milk quantity and safety in urban China: evidence from Beijing and Harbin”, *Australian Journal of Agricultural and Resource Economics*, 59(2) (2015): 275-287.
18. Desissa, F., Makita, K., Teklu, A. and Grace, D., “Contamination of informally marketed bovine milk with *Staphylococcus aureus* in urban and peri urban areas of Debre-Zeit, Ethiopia”. *African Journal of Microbiology Research* 6(29) (2012): 5852-5856.
19. Otte, J., Roland-Holst, D., Pfeiffer, D., Soares-Magalhaes, R., Rushton, J., Graham, J., and Silbergeld, E., Industrial livestock production and global health risks. Food and Agriculture Organization of the United Nations, *Pro-Poor Livestock Policy Initiative Research Report* (2007).

20. McLeod, A., *World livestock 2011-livestock in food security*, Food and Agriculture Organization of the United Nations (2011).
21. Thys, E., Schiere, H., Van Huylenbroeck, G., Mfoukou-Ntsakala, A., Ouedraogo, M. and Geerts, S., “Three approaches for the integrated assessment of urban household livestock production systems: Cases from Sub-Saharan Africa”. *Outlook on agriculture*, 35(1) (2006): 7-18.
22. Ishagi, N., Ossiya, S., Aliguma, L. and Aisu, C. (2002). *Urban and peri-urban livestock keeping among the poor in Kampala City*. Ibaren Konsultants, Kampala, Uganda.