

# Comparative assessment of livelihood roles of indigenous chicken in pastoral and agricultural households of Kenya

J E Lotesiro, A M King'ori and B O Bebe

Ministry of Agriculture, Pastoral Economy and Fisheries, Department of Livestock Production, Turkana County Government, P O Box 52, 30500 Lodwar, Kenya.

[lotesjak@yahoo.com](mailto:lotesjak@yahoo.com)

<sup>1</sup> Department of Animal Sciences, Egerton University, P O Box 536, 20115 Egerton, Kenya.

## Abstract

Indigenous chicken (IC), which have traditionally been important component of livelihoods among the agricultural households are being integrated into pastoral livelihoods as a diversification strategy to reduce vulnerability of their ruminant livestock to recurring drought events. The objective of this study was to contribute to improved livelihood benefits of indigenous chicken for food and income security in pastoral households. The study assessed household livelihood benefits from IC using the livelihood analysis framework in pastoral households compared to agricultural households. A questionnaire was administered to 256 randomly selected households in a cross sectional survey in Counties where pastoral (Turkana) and agricultural (Trans-Nzoia) households predominate. Data was subjected to chi-square test of independence when data were categorical variables and to independent sample t-tests when data were continuous variables. Compared to agricultural households, the pastoral households keeping IC were of lower literacy levels, younger age and lower income levels, had smaller flocks (6.70 vs 26.6) with more cocks (27.2% vs 10.2%) and fewer growers (40.4% vs 61.2%). Their foundation stock was more from gifts (67.2% vs 18.8%) and from Non-Governmental Organization (NGO) (29.7% vs 3.10%). Among pastoral households, the entire total monthly income was from IC (100% vs 20%) and they used the income predominantly to purchase food (89.1% vs 58.6%), to finance school fees (94.5% vs 39.8%) and to access health care services (95.3% vs 85.9%), but fewer used chicken manure in kitchen gardening (0.80% vs 92.2%). Results showed that livelihood roles of IC significantly differ between pastoral and agricultural households. Improving input and output markets and service delivery will be critical in further enhancing IC contribution to pastoral livelihoods.

**Key words:** *capital asset, household surveys, livelihood framework*

## Introduction

Pastoralism is a livestock based livelihood characterized by large herds of large and small ruminants that are frequently trekked over the vast rangelands in search of water, pasture and security from stock rustling. Worldwide, nearly a billion heads of ruminants contributing about 10% of the world's meat production are managed under pastoralism by about 200 million households (FAO 2001). In Kenya, pastoralism is practiced in about 75% of the land and is contributing to about KES 318.971

billion to the economy (Behnke and Muthami 2011). One region in Kenya where pastoralism dominates is Turkana County, but this livestock based livelihood is continuously destabilized because of its vulnerability to a myriad of livelihood shocks (López-i-Gelats et al 2016). Emergency interventions have included famine relief food supplies, which have not sufficiently stabilized livelihoods from frequently reoccurring shocks. In efforts to build stable livelihood base, the government and development agencies have shifted intervention strategies from food for work during the periods of shocks to livelihood asset diversification. One popular livelihood diversification strategy being implemented by development agencies and the county government is introduction of Indigenous Chicken (IC) in pastoral households on the premise of reducing food insecurity and poverty incidences. This study assessed household livelihood benefits using the livelihood analysis framework as shown in Figure 1 below.

**Figure 1.** Livelihood analysis framework, adapted from Chaminuka et al (2014).

### Study area

The study was carried out in Turkana and Trans-Nzoia counties (Figure 2). Turkana County is arid with pastoralism as a predominant livelihood. It is the second largest County in Kenya, with a land area of approximately 68,680 km<sup>2</sup>. It borders Uganda to the west, Sudan and Ethiopia to the north, Samburu and Marsabit Counties to the east and to the south it borders Baringo and West Pokot Counties. It lies between latitudes 0° 51' and 5° 30' N and longitudes 34° and 30° 40' E. (Watete et al 2016). In contrast, Trans-Nzoia County is a high potential agricultural maize-growing area (Jaetzold et al 2005) where IC is traditionally an important component of the livelihood.

**Figure 2.** Map of Kenya showing the study areas

### Methodology

#### Data source and sampling procedure

Primary data for the testing of the hypothesis of this study was obtained using a pre tested questionnaire in Turkana and Trans-Nzoia counties. Turkana County is classified as arid and semi-arid lands (ASAL) with pastoralism as a dominant livelihood reliant on ruminant assets (Jaetzold and Schimdt 1983) while Trans-Nzoia County is a highly potential agricultural maize growing area (Jaetzold et al 2005).

The minimum required sample (n) was estimated at 256 households from the formula of (Kish 1965):

Where SD is the standard deviation of flock size, ME is the margin of error for detecting significant change in flock size at 95% confidence interval represented by 1.96 value. The flock size standard deviation of 2.04 from the study of Okeno et al (2012) in the study area was substituted in the above formula with a marginal error corresponding to the ability to identify 25% change in the flock size as being significant at 5% level of significance with 80% power. The computed sample size was equally distributed for the two counties giving a total of 128 households per county.

The households were randomly obtained in a cross sectional survey in two multistage sampling. Turkana Central and Trans-Nzoia West sub-counties, being representative regions in the two counties where IC keeping dominates were identified with the help of local extension staff. Two locations were then randomly selected in each sub-county, one in rural and another in peri-urban to control for the influence of urbanization in uptake of IC observed in Turkana County (Okeno et al

---

2012). Two sub-locations in each location were further randomly selected in each sub-county. A list of IC keeping households was obtained in all the villages with the assistance of local administrators and agricultural officers. Thirty two households were obtained from the list selected in each of the four sub-locations in each county through simple random sampling procedure.

### **Data collection**

Data in scale, ordinal or nominal measurements was obtained with semi structured questionnaires previously pre-tested in non-study locations in the two counties. Primary data collected included household characteristics, flock size and structure, livelihood roles and benefits. Participants included households in Turkana and Trans Nzoia counties to represent pastoral and agricultural households respectively. Capital asset value of IC was defined under five categories namely; social, financial, human, natural and physical capital. Social capital are the networks or relationships that households can develop in the course of IC keeping to exploit livelihood activities. For this study, birds and eggs shared as gifts and loaned to relatives, the role of IC in social recreation through cock fighting and linkages created through external support to IC were considered as sources of social capital. Financial capital represents the economic assets, stocks and revenue flows which are key to attaining certain livelihood goals. For purposes of this study, total revenue flows obtained in Kenya shillings (KES) from sale of live birds, manure and eggs was considered as financial capital. Human capital refers to factors that can enable household individuals to participate in livelihood activities like education and health. For this study, the extent to which households invested IC income in foodstuff, to pay school fess and to buy medicines for household members were variables for human capital. Natural capital represents natural stock resources that have the ability to flow and provide services that can aid people's livelihoods. For this study, the use of IC manure as fertilizer in various farming activities by the households was used as proxy for IC contribution to natural capital. Physical capital is the infrastructure or services, tools and goods that are a necessity in making a living. The extent to which households used feathers in ceremonial events, eggshells use as supplement in chicken feed or household decoration, the use of birds as biological timers/clocks especially in waking up household members and use of birds as weed or pest controllers in farms were used as proxies for physical capital.

### **Data analysis**

The statistical tests performed compared pastoral and agricultural households for the livelihood roles of IC. Two test statistics were used: the t-test of mean difference and Chi square test for independence. Both tests were performed in SPSS version 22 platform.

All livelihood capitals were measured using categorical variables except financial capital. Social, human, natural and physical capitals in pastoral and agricultural households were variable counts and therefore the frequencies were subjected to chi-square test of independence. Financial capital was measured in KES which was a continuous variable and means between the two samples were subjected to t test to detect if significant differences existed. Flock size and structure were in continuous scale units and therefore were subjected to t-test to detect if significant mean differences existed.

## **Results**

### **Characteristics of the sample**

Description of the sample characteristics showed that more women than men kept IC in both pastoral and agricultural households, but compared to agricultural households, keeping of IC in pastoral

households was associated with lower literacy levels, younger age and lower income levels (Table 1).

**Table 1.** Sample characteristics of IC keeping households by livelihood

Factor	Level	Livelihood base		$\chi^2$
		Pastoral (%)	Agricultural (%)	
Gender	Male	35.2	32.8	0.157
	Female	64.8	67.2	
Education	None	59.4	11.7	71.9*
	Primary	23.4	37.5	
	Secondary	8.60	40.6	
	Tertiary	8.60	10.2	
Age (years)	<35	68.8	33.6	36.7*
	36-50	27.3	44.5	
	>50	3.90	21.9	
Total income	<2000	97.7	46.9	82.7*
	2001-5000	2.30	28.9	
	5001-10000	0	11.7	

---

>10000

0

12.5

-

---

\* $p < 0.05$

Flocks were smaller (6.70 vs 26.6) but with more cocks (27.2% vs 10.2%) and fewer growers and chicks (40.4% vs 61.2%) in the pastoral households compared to the agricultural households (Table 2).

**Table 2.** Indigenous chicken flock size and structure by livelihoods

---

Factor	Statistics	Livelihood base		Mean difference
		Pastoral	Agricultural	
Flock size	Mean $\hat{\pm}$ SD	6.70 $\hat{\pm}$ 6.30	26.6 $\hat{\pm}$ 22.5	19.8 <sup>***</sup>
Flock structure				
Cocks	%	27.2	10.2	0.992 <sup>*</sup>
Hens	%	32.4	28.6	5.40 <sup>*</sup>
Growers & chicks	%	40.4	61.2	13.5 <sup>*</sup>

---

\* $p < 0.05$ ; \*\*\* $p < 0.001$

#### Livelihood roles of the IC in the pastoral and agricultural households

##### *Social capital*

Both pastoral and agricultural households utilized IC for social recreation, but more of the pastoral built their foundation stock from gifts (67.2% vs 18.8%) and external support from NGO (29.7% vs 3.10%) as shown in table 3.

**Table 3.** Social capital derived from keeping IC by livelihoods

---

Social capital	Measures	Livelihood base		p <sup>2</sup>
		Pastoral (%)	Agricultural (%)	
Source of foundation stock	Gift	67.2	18.8	77.8
	Inherited	0	1.60	
	Purchased	32.8	79.7	
External support for sourcing IC				33.4
	None	69.5	94.5	
	NGO	29.7	3.10	
	Government	0.80	2.30	
Use of IC cock fights- social recreation events	No	98.4	97.3	0.20
	Yes	1.60	2.70	

\* $p < 0.05$

#### **Financial capital**

Compared to agricultural households, pastoral households had KES 13,858.50 lower total mean monthly incomes and were entirely from IC, unlike in the agricultural households where IC contributed only 20% of the total monthly incomes (Table 4).

**Table 4.** Incomes and proportion of income from IC by livelihoods

Income	Statistics	Livelihood base		
		Pastoral	Agricultural	Mean difference
Total income	Mean (KES/month)	610.70	14,469.20	13,858.50**
IC income contribution	%	100.0	20.0	80.0***

\*\* $p < 0.01$ ; \*\*\* $p < 0.001$

### **Natural capital**

Compared to agricultural households, fewer of the pastoral households used chicken manure in kitchen gardening (0.80% vs 92.2%) as shown in Table 5.

**Table 5.** Natural capital derived from IC keeping represented by use of chicken manure by the livelihoods

Manure use	Livelihood base		$\chi^2$
	Pastoral (%)	Agricultural (%)	
None	98.3	5.50	221*
Tree planting	1.60	0	
Farms	1.60	2.30	
Live fences	2.30	0	
Kitchen gardening	0.80	92.2	

\* $p < 0.05$ ;

### **Human capital**

Use of revenues from IC in food purchase, health care or school fees were proxies for human capital. Results show that compared to agricultural households, more of the pastoral households used income from IC to purchase food (89.1% vs 58.6%), to finance school fees (94.5% vs 39.8%) or accessing health care services (95.3% vs 85.9%) as shown in Table 6.

**Table 6.** Use of incomes from IC representing human capital by livelihood

Use of IC income	Livelihood base		$\chi^2$
	Pastoral (%)	Agricultural (%)	
Food purchases	89.1	58.6	34.0***
Healthcare	95.3	85.9	7.82*
School fees	94.5	39.8	49.3***

\* $p < 0.05$ ; \*\*\* $p < 0.001$

#### Physical capital

Feather use was not practiced by both households (99.2% vs 98.4%) though a few agricultural households (1.60%) used feathers in cultural events. Eggshells were not utilized in the pastoral households but were used as feed ingredient and decorations in agricultural households (100% vs 11%). Both households depended on IC cocks as biological clocks although this was higher in pastoral households (90.6% vs 71.4%). Less than 30% of both households used IC in weed/pest control although this was lower in pastoral households (4.70% vs 28.9%) as shown in Table 7.

**Table 7.** Use of IC and IC products as physical capital by livelihood

Capital	Specific capital	Livelihood base		$\chi^2$
		Pastoral (%)	Agricultural (%)	
Feather use	No	99.2	98.4	3.00
	Cultural	0	1.60	
	Others	0.80	0	
Eggshell use	None	100	89.1	14.8*

	Chicken feed	0	10.2	
	Decorations	0	0.80	
Use IC as bio-clocks	No	9.40	28.6	15.0*
	Yes	90.6	71.4	
IC as weeds/pest controls	No	95.3	71.1	26.9*
	Yes	4.70	28.9	

\* $p < 0.05$ ;

## Discussion

Management of IC flock was under women in both pastoral and agricultural households, which reflects strong cultural influence that associates women with less valued assets, leaving to men the highly valued ruminant livestock assets. This is in agreement with previous studies (Kirwa et al 2010), (Meseret et al 2011) and KarmebÅrck et al (2015) who reported an increase in pastoral women keeping poultry. Their characteristics were low literacy, younger age and low income, which explains why IC was their sole source of income used to meet cash needs of the households. The high illiteracy levels among IC keeping households observed in this study has been observed in the past (Mwale and Masika 2009).

The findings that more younger pastoral households kept IC contradicts the findings of Adeniyi and Oguntunji (2011) that most of the IC keepers are adults, but their study was among the agricultural households.

Pastoral households kept smaller flock size than the agricultural households, which could be an influence of the peri-urban settings where the sampled households were residing and probably the ecological zones (Muchadeyi et al 2007; (Okeno et al 2012) as well as livelihood roles and feeding capacity of the household. As expected, hens and growers comprised larger proportion of the flock to sustain flock growth and to supply eggs to the household, and so less are slaughtered or sold (Ochieng et al 2013).

This study shows that IC is of importance in provision of social capital among pastoral than among the agricultural households. This enabled pastoral households obtain foundation stock through gifting from other households or relations, in contrast to agricultural household who obtained foundation stock through purchases, implying making individual investment. Exploitation of social capital among

---

the pastoral households is a cultural tenet that still encourages asset sharing, but it contradicts the findings of Kaye-zwiebel and King (2014) that pastoralists have reduced social capital sharing through gifting and sharing of resources. However, the present results showing agricultural households obtaining their foundation stock through individual investments is in agreement with the observations of Mwobobia et al (2016) that seed chicken was predominantly through purchases among the agricultural households. Both households did not use their flocks in cock fights as a social recreation activity, an indication of diminishing cultural practices as a result of urbanization among the Luhya community because the samples were drawn from peri-urban areas. Agricultural households derived more financial capital from IC than pastoral households with earned cash income in excess of twenty times the amount earned by pastoral households. This could be attributed to the smaller flock sizes and limited commercialization of IC among pastoral households. Interestingly, the IC income in pastoral households represented the only source of income unlike in agricultural households. This is an important observation, demonstrating the success of IC in livelihood diversification under limited livelihood options in the pastoral areas. More of the pastoral households used the income to purchase food (89.1% vs 58.6%), to finance school fees (94.5% vs 39.8%) and to access health care services (95.3% vs 85.9%).

The highest mean monthly income of KES 14,469.20 from agricultural households in this study is within the range of less than KES 20,000 income observed in agricultural IC keeping households (Kyule et al 2014).

Fewer of the pastoral households were exploiting natural capital of IC compared to the agricultural households who nearly all used chicken manure on their kitchen gardens. This observation reflects limited agricultural activities among the pastoral households in the peri-urban areas in contrast to the agricultural households who are actively farming and need manure to sustain soil fertility for improved vegetable production which they consume and sell surplus for income (Muchadeyi et al 2004; Nakkazi et al 2014).

Nearly all pastoral households did not benefit from physical capital from IC compared to agricultural households in use of feathers for cultural events and use of egg shells. Almost all sampled households used IC as timers or clocks to wake them up to engage in productive livelihood activities although this was higher for pastoral households. This was anticipated due to the effect of urbanization in agricultural areas with households using modern timing gadgets like watches and alarm clocks leaving this to rural areas (Magothe et al 2012). Fewer of the sampled households used IC as weeds/pest controllers in their farms. This was expected as the concept and the demand for food produced organically is not well developed in the country.

## **Conclusion and recommendation**

The results of this study show that livelihood roles of IC significantly differ between pastoral and agricultural households and the contribution to pastoral livelihoods can be enhanced with improved input and output markets and service delivery. Because livestock development is a mandate of the devolved County governments in Kenya, this intervention needs to be prioritized in the County development plans.

## **Acknowledgements**

Thanks to higher education loans board, Kenya for granting partial scholarship and Turkana County Government, Kenya for granting study leave to the first author. Authors also thank Mr. Christopher Lowalan Ajele and Mr. Nicholas Kakuko for supporting data collection in Turkana and Trans-Nzoia

---

counties respectively.

## References

- Adeniyi O R and Oguntunji A O 2011** A socio-economic survey of cultural practices and management of village poultry production in Ondo area , Nigeria. *Livestock Research for Rural Development*, 23(12). Retrieved from <http://www.lrrd.org/lrrd23/12/aden23261.htm>
- Behnke R and Muthami D 2011** The contribution of livestock to the Kenyan economy. IGAD LPI working paper No.03-11. Addis Ababa, Ethiopia.
- Chaminuka P, Udo H M J, Eilers K C H A M and van der Zijpp A 2014** Livelihood roles of cattle and prospects for alternative land uses at the wildlife/livestock interface in South Africa. *Land Use Policy*, 38, 80–90. <http://doi.org/10.1016/j.landusepol.2013.10.007>
- FAO 2001** Pastoralism in the new millennium. Animal Production and Health Paper No. 150, UN Food and Agriculture Organization, Rome, Italy.
- Jaetzold R and Schimdt H 1983** Farm Management Handbook of Kenya. Vol. II. Natural Conditions and Farm Management Information. Cooperation with German Agricultural Team of German Agency for Technical Cooperation.
- Jaetzold R, Schimdt H, Hornetz B and Shisanya C 2005** Natural conditions and farm management information. In *Farm Management handbook of Kenya* (2nd ed., pp. 20–275). Nairobi, Kenya: Ministry of Agriculture, Republic of Kenya.
- Karumbi V N, Wairore J N, Jirström M and Nyberg G 2015** Assessing gender roles in a changing landscape: diversified agro-pastoralism in drylands of West Pokot, Kenya. *Pastoralism*, 5(1), 21. <http://doi.org/10.1186/s13570-015-0039-4>
- Kaye-Zwiebel E and King E 2014** Kenyan pastoralist societies in transition: varying perceptions of the value of ecosystem services. *Ecology and Society*, 19(3). <http://doi.org/10.5751/ES-06753-190317>
- Kirwa E C, Muthiani E N and Ndathi A J N 2010** Pastoral chicken production trends?: the case of Mashuru and Loitokitok Divisions in Kajiado district , Kenya. *Livestock Research for Rural Development*, 22(7). Retrieved from <http://www.lrrd.org/lrrd22/7/chep22124.htm>
- Kish L 1965** Survey sampling. New York: John Wiley and Sons, Inc.
- Kyule N M, Mwangi J G and Nkurumwa O A 2014** Indigenous chicken marketing channels among small-scale farmers in Mau-Narok division of Nakuru County, Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(9), 55–65.
- López-i-Gelats F, Fraser E D G, Morton J F and Rivera-Ferre M G 2016** What drives the vulnerability of pastoralists to global environmental change? A qualitative meta-analysis. *Global Environmental Change*, 39, 258–274. <http://doi.org/10.1016/j.gloenvcha.2016.05.011>
- Magothe T M, Okeno T O, Muhuyi W B and Kahi A K 2012** Indigenous chicken production in Kenya: I. Current status. *World's Poultry Science Journal*, 68(1), 119–132.

**Meseret M, Solomon D and Tadelle D 2011** Marketing System , Socio Economic Role and Intra Household Dynamics of Indigenous Chicken in Gomma Wereda , Jimma Zone , Ethiopia. *Livestock Research for Rural Development*, 23(6). Retrieved from <http://www.lrrd.org/lrrd23/6/mese23131.htm>

**Muchadeyi F C, Sibanda S, Kusina N T, Kusina J and Makuza S 2004** The village chicken production system in Rushinga District of Zimbabwe. *Livestock Research for Rural Development*, 16(6). Retrieved from <http://www.lrrd.org/lrrd16/6/much16040.htm>

**Muchadeyi F C, Wollny C B A, Eding H, Weigend S, Makuza S M and Simianer H 2007** Variation in village chicken production systems among agro-ecological zones of Zimbabwe. *Tropical Animal Health and Production*, 39(6), 453–461. <http://doi.org/10.1007/s11250-007-9050-0>

**Mwale M and Masika P J 2009** Ethno-veterinary control of parasites, management and role of village chickens in rural households of Centane district in the Eastern Cape, South Africa. *Tropical Animal Health and Production*, 41(8), 1685–1693. <http://doi.org/10.1007/s11250-009-9366-z>

**Mwobobia R M, Amwata D A and Kanui T I 2016** Comparing production characteristics of poultry farmers in Katulani District , Kitui County , Kenya. *Livestock Research for Rural Development*, 28(5). Retrieved from <http://www.lrrd.org/lrrd28/5/mwob28093.html>

**Nakkazi C, Kayitesi A, Mulindwa H E, Kugonza D R and Okot M W 2014** The status of local chicken ( *Gallus domesticus* ) production in Northern Uganda. *Livestock Research for Rural Development*, 26(11). Retrieved from <http://www.lrrd.org/lrrd26/11/nakk26198.html>

**Ochieng J, Owuor G and Bebe B O 2013** Management practices and challenges in smallholder indigenous chicken production in Western Kenya. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 114(1), 51–58. Retrieved from <http://nbn-resolving.de/urn:nbn:de:hebis:34-2013030542607>

**Okeno T O, Kahi A K and Peters K J 2012** Characterization of indigenous chicken production systems in Kenya. *Tropical Animal Health and Production*, 44(3), 601–608. <http://doi.org/10.1007/s11250-011-9942-x>

**Watete P W, Makau W-K, Njoka J T, AderoMacOpiyo L and Mureithi S M 2016** Are there options outside livestock economy? Diversification among households of northern Kenya. *Pastoralism*, 6(3). <http://doi.org/10.1186/s13570-016-0050-4>