111 EAAE-IAAE Seminar 'Small Farms: decline or persistence'
University of Kent, Canterbury, UK
26[th.]- 27th. June 2009

**What Influences Price Efficiency in Indigenous Chicken Markets in Africa?
Evidence from Smallholder Farmers in Kenya**

Owuor George and Bebe Bocklain

Owuor and Bebe are Lecturers from Egerton University, Box 536 Egerton, Kenya.
Correspondence author: George Owuor. Email: gowuor2001@yahoo.com

ABSTRACT
This study explored appropriate options for smallholders to maximise market price for
Indigenous chicken products in rural and urban markets in Western Kenya (Rongo,
Homabay and Kisii in 2008 with results revealing that, the major participants along the
indigenous chicken supply chains are village brokers, distant traders, and urban
assemblers, who eventually sell hotels, butchers and households. Buyers preferred hens
followed by cocks, and attached greater preference on weight and high market prices.
The price differential was un-uniform, with the larger differentials recorded between
farmers and the middlemen. Turnover and losses were however the key determinants of
the selling price. The study thus recommends training of farmers on the market linkages
and on accessing market information about final consumer prices and preferences. Last,
but not least, interventions to empower farmers to carryout selection for improved weight
through feeding should be encouraged.

Key words: Indigenous chicken, market efficiency, Kenya

1 INTRODUCTION

Kenya along with other developing countries has been experiencing a rising demand for foods of animal origin for quite along time (Delgado et al, 2001; Jensen, 2002). Despite this, consumption and production trends strongly suggest that much of the demand for meat will have to be met through increased poultry production (Delgado et al, 2001). The poultry of importance in Kenya is the indigenous chickens (*Gallus domesticus*). Indigenous chicken, accounts for over 80% of the poultry population and 40 to 60% of the domestic marketed poultry eggs and meat (Upton, 2000). It is of great importance in the livelihoods of many poor rural households in Kenya for nutrition, income, savings, and insurance against emergencies, cultural and ceremonial purposes (SRA, 2004-2014).

Though kept by majority (86%) of the households, Indigenous chickens are of low commercial exploitation compared to the industrial hybrid poultry. Poor market efficiency and information have been cited as major contributors to the low commercial exploitation (Upton, 2000; Mathuva, 2005). This is in spite of the favourable attributes of the indigenous chickens that suit contemporary demand, such as adaptation to production circumstances of scavenging production systems, disease tolerance, adaptation to inadequate quantity and quality feeding, poor housing and health care (Guèye, 1998; Katalyi, 1998). In addition meat and eggs from Indigenous chickens are increasingly preferred for their tasty, safe and nutritious qualities as consumers increasingly shift their preferences towards traditionally produced animal products (Upton, 2000).

Markets are increasingly seen in Kenya as a good instrument for poverty reduction and sustainable development (KAPP, 2006). However, market inefficiencies and shortcomings in the information diminish the impact of markets on poverty. Past efforts have not efficiently utilised potentially important attributes of the Indigenous chickens for the emerging consumer preferences and niche markets, but rather on productivity through crossbreeding of Indigenous chickens with less adaptable industrial hybrid poultry, which to a larger extent, has proved unsuitable, unprofitable, too risky, too labour intensive, or impossible to implement (Upton, 2000). In subsistence systems, sustainable productivity can be achieved if farmers receive attractive market prices for the valuable attributes of their Indigenous chickens. Appropriate knowledge and skills of the target markets are thus necessary to sustain the multiple benefits of Indigenous chickens for poverty alleviation.

This study explored appropriate options for smallholders to maximise market price for Indigenous chicken products in rural and urban markets in Rongo and Homa bay districts, by identifying rural and urban markets, establishing market price differentials along the indigenous chicken supply chains, consumer preferences and the extent to which indigenous chicken products satisfy those market demands.

2 METHODOLOGY

2.1 The Study Area

The survey was carried out in Rongo and Homa-bay districts of Nyanza province targeted at smallholder farmers (farmers rearing between 10-50 birds) presently experiencing highest poverty incidences in the country. Indigenous chickens account for over 80% of the poultry population and over 85% of the marketed poultry eggs and meat in the area (MALD, 2003). The targeted households experience poverty incidences of above 65%, they are purely agricultural households earning about US$ 2.4 a day on which they have to support a family of six people (GoK, 2000). Women are the most vulnerable, with 69% of them on subsistence agriculture compared to 43% of the men. Agricultural productivity is declining due to the impact of HIV/AIDS, malaria and water-borne diseases such as typhoid and cholera, prevalent in the region. Faced with no viable alternative off-farm income, majority (86%) of them keep an average of 10 indigenous chickens for nutrition, income, savings, insurance against emergencies, cultural and ceremonial purposes. Some households keep up to 100 birds, but are of low commercial exploitation because of low productivity compared to industrial hybrid poultry. A cross-sectional market survey of selected major rural and urban markets in Rongo and Homabay districts was conducted to characterise the market demands and identify factors determining market price of the Indigenous chicken products.

2.2 Analytical Model

Both descriptive analysis and ordinary least squares regressions estimated using seemingly unrelated regression routines were used to establish factors that influence price variability along the supply chains, with the dependent being price. Because contemporaneous correlation existed between the variables, it was more efficient to estimate all equations jointly with the seemingly unrelated regression estimator (SUR), rather than estimate each one separately using least squares (Greene, 1993). The data were tested for contemporaneous correlation using the Lagrange multiplier statistic suggested by Breusch and Pagan (1979). The estimated chi-squared values for the Ghana and Cameroon models were, respectively, 64.5 and 17.5. The null hypothesis of zero covariance was therefore rejected at the 1% level of significance in favor of the alternative hypothesis that at least one covariance is nonzero for both models. Consequently, the use of SUR for parameter estimation was justified.

3 RESULTS AND DISCUSSION
3.1 Indigenous chicken marketing channel

The marketing channel for indigenous chickens with their corresponding selling prices is illustrated in Figure 1. There are three main actors after the farmer: the village broker, distant trader and urban trader assemblers. The village brokers and the distant traders are middlemen actors in stiff competition for chickens at the farm level. The village brokers have closer trade relationship with the farmers and buy chickens regularly then sells in the nearest local market on market days. Their trading is limited to the nearest local market.
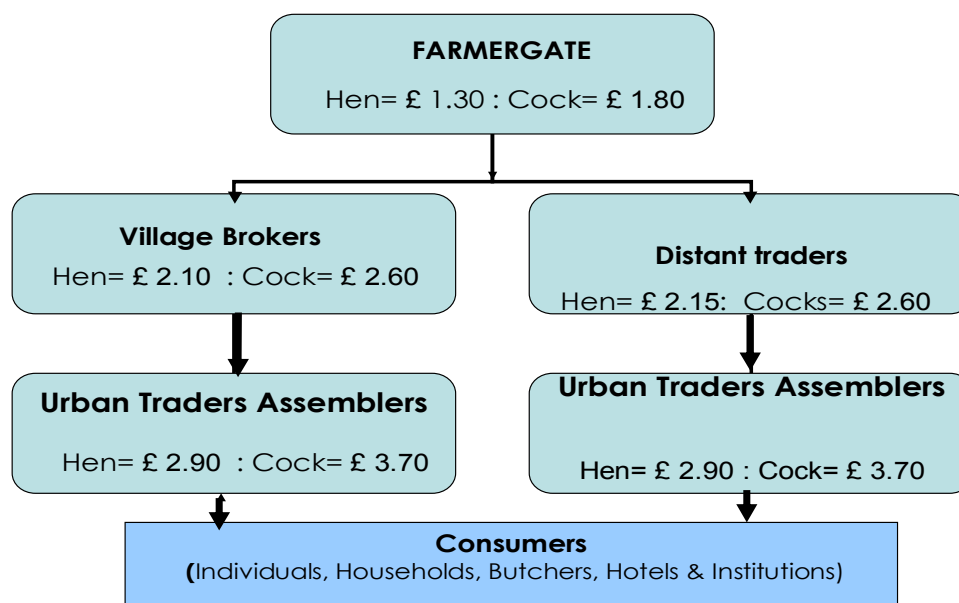
FARMERGATE

Hen= £ 1.30 : Cock= £ 1.80

Village Brokers

Hen= £ 2.10 : Cock= £ 2.60

Distant traders

Hen= £ 2.15: Cocks= £ 2.60

Urban Traders Assemblers

Hen= £ 2.90 : Cock= £ 3.70

Urban Traders Assemblers

Hen= £ 2.90 : Cock= £ 3.70

Consumers
(Individuals, Households, Butchers, Hotels & Institutions)

Figue 1: Indigenous chicken marketing channels operating in western Kenya

Competition between the middlemen (village broker and the distant trader) was both at the farm and the urban market. They compete for urban market where they sell their stock to urban trader assemblers, who are either individual entrepreneurs or Self Help Groups trading in chickens. Urban trader assemblers operate in a central location within a municipal market where they own stalls with a capacity of up to 50 birds. These assemblers sell stock to urban consumers comprising individual customers, hotels, butchers and institutions.

A middleman increases the selling price when there is loss from deaths, thefts, or during transport to the market. For loss of one chicken, middleman increases the price of chicken by £ 0.05 for a hen and by £ 0.10 for a cock. With this practice, middlemen pass on own costs either backwards to the farmers or forwards to buyers in the urban market which contributes to the large price differentials and some degree of exploitation of the farmers. These price differentials translates into farmers capturing only 52% and 61% of the final sell value of cock and a hen, respectively as shown in Table 1.

Table 1. Comparative selling prices and the price ratios along the market channels

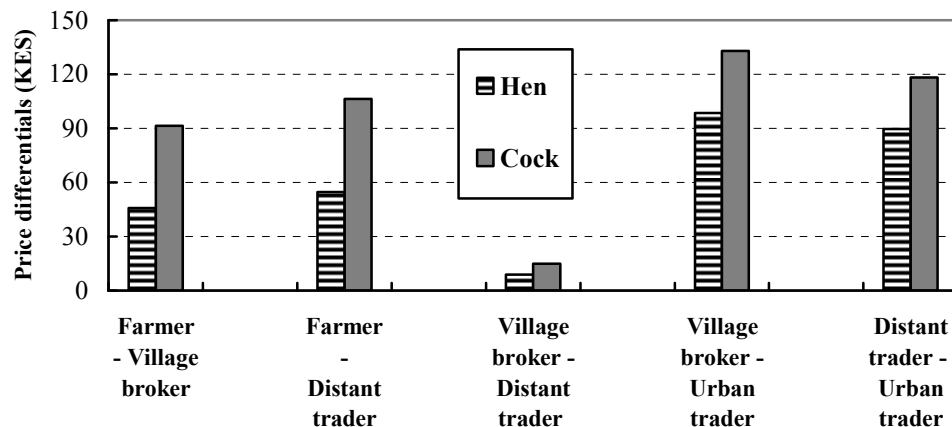| Channel point actor	Selling price (KES)		Proportion (%) of price that the farmers captures	
	Hen	Cock	Hen	Cock
Farmer	1.30	1.80		
Village broker	2.10	2.60	85.4	74.6
Distant trader	2.15	2.75	82.4	74.10
Urban trader	3.00	3.75	60.6	51.7

Figure 2. Comparative selling price differentials along the marketing channels for hens and cocks in Rongo, Homabay and Kisii districts of western Kenya

3.2 Determinants of Efficiency in market price along the marketing Supply Chains

The determinants of hen and cock purchase prices offered by the middlemen to farmers, by urban traders to middlemen and by urban consumers to urban traders were examined with seemingly unrelated regression model in STATA **.** In Table 2, the specifications of all fitted regression models have P <0.05 chi-square values, implying that a high percentage of the changes in the dependent variables are associated with the fitted explanatory variables.

Table 2. Specifications of the fitted seemingly unrelated regression model for the price Spread efficiency

Dependent variable	Obs (n)	Parameters	RMSE	"R-sq"	χ^2	P value
Hen farm gate price	58	5	71.79	0.51	60.29	0.00
Cock farm gate price	58	5	81.42	0.58	79.55	0.00
Hen Middleman price	58	5	32.51	0.14	9.42	0.09
Cock middleman price	58	5	16.29	0.25	18.98	0.00
Hen urban trader price	58	5	27.94	0.35	30.73	0.00
Cock Urban trader price	58	5	35.12	0.48	53.84	0.00

Table 3 presents per unit marginal changes in prices of hens and cocks associated the hypothesised price determinants. For one unit increase in the stock turnover (calculated as sales divided by total handled), the prices middlemen offer significantly (P=0.00) increases, by £ 0.05 for a hen by £ 0.06 for a cock. This is a demand and supply response, in which turnover increases with the demand and in turn inducing price increases. This occurs with season of holiday festivities when demand for chicken is highest in the region. However, middlemen offer lower prices to offset the transport costs and losses from theft and diseases. Results demonstrate that middlemen pass transaction costs and losses from deaths and theft on to farmers, which contributes to the observed high price differentials (Figure 2) and points to some degree of exploitation of the farmer.

4

Table 3. Determinants of hens and cocks Price Spread Efficiencies

Channel point	Determinants	Coef.	Std. Err.	z	P>|z|
Hen farm gate price	Experience in trading (yrs)	2.39	2.10	1.14	0.26
	If trained in business Mgt (yes, no)	-96.00	88.57	-1.08	0.28
	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	5.90	0.90	6.55	0.00
	Losses (numbers)	-15.17	10.10	-1.50	0.09
	Transport cost (KES)	-0.01	0.00	-4.19	0.00
	Intercept	69.59	20.49	3.40	0.00
Cock farm gate price	Experience in trading (yrs)	4.69	2.38	1.97	0.05
	If trained in business Mgt (yes, no)	-119.70	100.45	-1.19	0.23
	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	7.32	1.02	7.16	0.00
	Losses (numbers)	-23.63	11.45	-2.06	0.04
	Transport cost (KES)	-0.02	0.00	-4.97	0.00
	Intercept	68.81	23.24	2.96	0.00
Hen Middleman price	Experience in trading (yrs)	0.20	0.48	0.41	0.68
	If trained in business Mgt (yes, no)	-15.82	20.10	-0.79	0.43
	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	-0.28	0.20	-1.37	0.17
	Losses (numbers)	6.23	2.29	2.72	0.01
	Transport cost (KES)	0.02	0.01	1.70	0.09
	Intercept	1.81	4.65	0.39	0.70
Cock middleman price	Experience in trading (yrs)	1.15	0.95	1.21	0.23
	If trained in business Mgt (yes, no)	-10.81	40.10	-0.27	0.79
	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	-0.37	0.41	-0.91	0.37
	Losses (numbers)	10.11	4.57	2.21	0.03
	Transport cost (KES)	0.00	0.00	-0.49	0.62
	Intercept	3.28	9.28	0.35	0.72
Hen urban trader price	Experience in trading (yrs)	-0.01	0.82	-0.01	0.99
	If trained in business Mgt (yes, no)	-25.75	34.47	-0.75	0.46
	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	-0.31	0.35	-0.89	0.37
	Losses (numbers)	10.68	3.93	2.72	0.01
	Transport cost (KES)	0.03	0.02	-3.62	0.00

	Intercept	99.31	7.97	12.46	0.00
Cock	Experience in trading (yrs)	0.59	1.03	0.57	0.57
Urban	If trained in business Mgt (yes, no)	-25.16	43.33	-0.58	0.56
trader					
price	If credit obtained (yes, no)	(dropped)			
	Turnover (sales /total handled)	-0.30	0.44	-0.67	0.50
	Losses (numbers)	12.10	4.94	2.45	0.01
	Transport cost (KES)	-0.01	0.00	-5.70	0.00
	Intercept	145.97	10.02	14.56	0.00

When selling to urban traders, middlemen receive higher prices, by KES £ 0.05 for a hen and by £ 0.10 for a cock for a unit increase in bird lost (Tale 3), showing that middlemen pass on own costs either forward to the buyers in the urban market or backwards to the farmers. As costs rise, they transfer it to the next level in the channel by raising prices to cushion such expenditures. By transferring own costs forward they escalate prices to the urban traders, who eventually do the same to the final consumers. From the regression estimates, transport costs seem of less importance to urban traders, because middlemen absorb bulk of the transport costs delivering stock to market stalls of the urban traders. Very few of the urban traders had trained in business management and obtained credit for indigenous chicken enterprise, explaining their less importance in determining price differentials.

3.3 Constraints in Indigenous chicken marketing along the supply chains

Table 4 presents results of traders ranking of marketing constraints on scale of 1 to 4 being from least severe (1) to very severe (4). Middlemen rank most of the constraint high, indicating that they face many marketing constraints than the farmers or urban traders. High mortality and high taxes charged at market entry are the major constraints farmers face. Urban traders point out irregular supply, fluctuating prices and limited market information as the main constraints.

Table 4: Mean and standard deviations of marketing constraints

Constraint	Farmers	Village brokers	Distant traders	Urban trader assemblers	Sample overall
Irregular supply	-	3.4 ± 2.8	3.5 ± 2.8	3.2 ± 1.7	3.1 ± 2.5
Fluctuating prices	1.7± 3.2	2.7 ± 1.2	3.7 ± 1.5	3.0 ± 2.1	2.9 ± 2.4
Market information	1.5 ± 2.3	3.1 ± 2.3	2.9 ± 1.8	2.8 ± 1.5	2.8 ± 1.9
High bird mortality	2.4 ± 1.6	3.1 ± 1.4	3.5 ± 2.1	1.4 ± 2.1	2.6 ± 1.9
High taxes charged	2.6 ±1.7	2.8 ± 1.8	1.7 ± 1.8	0.7 ± 1.5	1.9 ± 1.9
High competition	-	2.6 ± 1.9	2.1 ± 2.1	0.9 ± 1.6	1.8 ± 1.8
Theft	0	2.5 ± 0.8	1.4 ± 1.0	0.5 ± 0.2	0.5 ± 0.2

3.4 Subjective Preferences and Price Variations in Rural and Urban Market s

Findings on subjective preferences as elicited by buyers of indigenous chicken along the supply chains (Table 5) show that hens are a more preferred phenotype across all the markets. In the rural markets the next preferred phenotype is the cocks then growers and cockerels. In the urban markets cockerels are the next most demanded phenotype. Overall the cocks and cockerels follow hens in demand. These results indicate the importance attached to hens for reproduction, further pointing at the dual role hens play in a typical household; that of an income generating phenotype as well a generational sustainability.

Table 5: Probability estimates for Indigenous Chicken Market preferences

Important Criteria			
Variable	Rural	Urban	Total
Hens (%)	33	55	53
Growers (%)	17	15	15
Cocks (%)	33	15	16
Cockerels (%)	17	16	16
(N)	6	55	61
Important Market Attributes			
High Customer demand (%)	17	5	6
High Market value (%)	17	23	22
Easy handling (%)	0	2	2
Demand for celebrations (%)	50	26	29
Size and weight (%)	17	42	40
N	6	57	63

In the case of market attributes, results show that celebrations constitute the most important (50%) purpose for buyers of birds in the rural markets, and comes second (26%) in the urban markets, while the reverse is true for size and weight, indicating that the two factors constitute the major reasons for purchasing birds. In actual fact, in the case of rural areas, preferences for celebrations are consistent with the general trend in Kenya, and particularly the western part of the country.

4 CONCLUSION AND RECOMMENDATIONS
The major participants along the indigenous chicken supply chains after the farmers are the village brokers, distant traders, and the urban assemblers, who eventually sell to final hotels, butchers and individuals. Buyers preferred hens followed by cocks, with attributes such as weight attracting higher market price during celebrations. The price differential was un-uniform, with the main price differentials recorded between farmers and the middlemen made up of village brokers and distant traders. Turnover and losses were however, the key determinants of the selling price. The study thus recommends linkage with urban hotels to minimize transaction costs and reduce price variability between urban and farm gate.

REFERENCES
Antonio, A., Carlos, A., 2004. Technical Efficiency and Farm Size. Journal of Agricultural Economics. 30, 241 – 250.

Delgado, C. L., Mark, W. R., Meyer, S., 2001. Livestock Revolution to 2020: The Revolution Continues. Annual meeting of the International Agricultural Trade Research Cons (ATRC), Auckland, New Zealand January 18th -19th.

GoK, 2000. Government of Kenya, Second Report on Poverty in Kenya, vol. 2, Poverty and Social Indicators. Ministry of Finance and Planning, Nairobi, Kenya, 174 pp.

GoK, 2005. Geographic Dimensions of Well-Being in Kenya: Who and Where are the Poor? A constituency Level Profile, Ministry of Planning and National Development, Central Bureau of Statistics, Volume II

Greene, W.H., 1993. Econometric Analysis. Macmillan Publishing Company. New York, 791 pp. Judge, G.G., Griffiths, W.E., Hill,

Guèye, E. F., 1998. Village egg and fowl meat production in Africa. World's Poultry Science Journal. 54, 73-86.

Jensen, H.A., 2002. Structures for improving smallholder chicken production in Banglandesh - breeding strategy. In: Galal, S., Boyazoglu, J., Hammond, K. (Eds.), Proceedings of the Workshop on Developing Breeding Strategies for Lower Input Animal Production Environments, 22-25 September, 1999, Bella, Italy, ICAR Technical Series. 3, 395-406.

ILRI/IFPRI/IPAR, 2002. "Differential Impacts of Policy and Scale Factors on Livestock Production in Kenya: The Case of Dairy and Poultry Farming. (Draft Report)

KAPP., 2006. Status Report, July 2006, Kenya Agricultural Productivity Programme, MoA, MLFD and KARI, Kilimo House, Nairobi.

King'ori, A.M., Tuitoek, J.K., Muiruri, H.K., Wachira, A.M., 2003. Protein requirements of growing indigenous chicken during the 14-21 weeks growing period. South African Journal of Animal Science. 33, 2.

Kitalyi, A. J., 1998. Village chicken production systems in Africa. Food and Agricultural Organization of the United Nations (FAO) Animal Production and Health Bulletin, 142, Rome, Italy, pp.

MALD, 2003. Ministry of Agriculture, Livestock Development and Marketing, Annual Report, Government Press, Nairobi, Kenya, 102 pp.

Mathuva, J. M., 2005. Value chain analysis of the indigenous poultry Sub-sector, Kilifi and Kwale districts – Kenya. Coastal Rural Support Programme, Kenya CRSP (K). 65pp

McAish, C.V., Kristensen, A.R., 2004. Dynamics modelling of a traditional African chicken production system. Tropical Animal Health and Production. 36, 1-17.

SRA 2004-2014. Strategy for Revitalization of Agriculture" MoA and MoL&FD. Nairobi, Kenya

Tedelle, D., Alemu, Y., Peters, K.J., 2000. Indigenous chicken in Ethiopia: genetic potential and attempts at improvement. World's Poultry Science Journal. 56, 45-54.

Upton ,M., 2000. The Livestock Revolution, Implications for Smallholder Agriculture: A Case Study of Milk and Poultry Production in Kenya. A Policy Discussion Paper, 1, Food and Agricultural Organization, Rome.