Research Article

Farmers' Attitude towards Risk on Indigenous Chicken in Nyanza Region

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Kenya has an estimate of 25.9 million indigenous chicken that support livelihood of over 21 million people in rural areas. Indigenous chicken production in Kenya is mainly under extensive and semi intensive systems which are characterized by high mortality rates resulting from disease outbreak, predation, poor feed quality and inbreeding. An understanding of the farmers' attitude towards production risks is important for effective management of the risks. However, there is limited information on farmers' behaviour towards risk on indigenous chicken.Therefore this study aimed at assessing the attitude of the farmers towards risk on indigenous chicken. Primary data was collected using structured questionnaire. Multi stage sampling procedure was used to sample 240 indigenous chicken farmers from a target population of 598 indigenous chicken farmers in Nyanza region. Safety-first principle was used to estimate the farmers' attitudes towards risk on indigenous chicken. Results revealed that cost of feeds was the most significant input in the indigenous chicken production. The study also found that all the indigenous chicken farmers exhibited intermediate risk aversion. Packages of technological and institutional practices should be tailored towards the risk attitude of the farmers for successful implementation of such development programmes. Appropriate agricultural policies should be developed to reduce risk such as agricultural insurance.

Key words: Risk, Attitude and Indigenous Chicken

INTRODUCTION

Agriculture is one of the key sectors envisaged under the economic pillar of the Vision 2030 to deliver the 10% annual economic growth (GOK, 2007). To achieve this growth, the agricultural sector development strategy advocates for transforming smallholder agricultural systems from subsistence to an innovative commercially (business) oriented and modern agricultural sector (GOK, 2010). Kenya has an estimate of 32 million poultry out of which 81 percent are indigenous chicken (IC) that support livelihood of over 21 million people in rural areas (MOLFD, 2007; Nyaga 2007; Omiti, 2011). Nyanza region has approximately 5,605,478 birds (Kenya National Bureau of Statistics, 2009). These chicken play an important role in income generation, food production, employment creation and promotion of overall economic development (Moreki *et al.,* 2010; Thorton *et al.,* 2012; Kyule *et al.,* 2014).

Indigenous chicken rearing has many advantages, which include the existing unmet market demand for indigenous chicken meat and eggs (ARD, 2012; WSPA, 2012). A study by USAID revealed that most consumers in East African region prefer indigenous chicken to exotic breeds (USAID, 2010). In addition, the consumers have exhibited willingness to pay extra amount for the indigenous chicken products (Bett *et al.,* 2011). Its role in the economic parlance gives the necessity for critical attention.

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Indigenous chicken production in Kenya is mainly under two distinct production systems namely semi intensive and extensive (free range) systems, although intensive systems are also emerging. The free range system is the most predominant system and is common in rural areas where the chicken are kept on a small-scale using locally available feed resources (Okitoi *et al.* 2007; Okeno *et al.* 2011). Semi intensive system is usually found in the urban and peri-urban areas. The birds are left to scavenge during the day and are confined in shelters of moderate cost at night. They also get supplementation with grains, oil seed cake, food waste and commercial feeds (Kingori *et al.* 2010). Productivity of indigenous chicken in these systems, in terms of egg production, growth and survival of chicks remains low (Wachira *et al.* 2010). Hens lay about 45 eggs a year with mean egg weight of approximately 47.4g. Hatchability is low at about 70% and chicken take 6-7 months to attain a maturity size of 1.5 kg, with a resultant carcass weight of about 0.5kg. High mortality has been recorded in chicks (44%) resulting from high incidences of disease outbreaks (44%), predation (8%), inbreeding (8.3%) which is higher than accepted levels 1-2%, and poor feed quality (Magothe *et al.* 2006; Okeno *et al.* 2011; Olwande *et al.* 2010). The indigenous poultry do not attain their potential economic level due to exposure to risk against their survival, production and marketing.

The situation of risk and uncertainty under which agricultural enterprises operate make agriculture a risky activity (Akcaoz and Ozkan 2005). Risk is the probability attached to the occurrence of the uncertain events of a production or investment decision by a farmer (Hardaker *et al.* 2004). Sources of risk in agriculture include production or yield, marketing or price, institutional or policy and legal, human or personal, technological and financial risks (Drollete 2009; Hardaker *et al.* 2004). Within indigenous chicken production systems, the main sources of risks include diseases and parasites, predators, poor nutrition, price fluctuation and lack of markets for the products (Mungube *et al.* 2008; Bett *et al.* 2012). In a situation like this, it is important to understand the farmers' attitudes towards risk in order to effectively manage risk (Ayinde *et al.* 2008; Liu 2008; Alphizar 2010).

Risk attitudes can be categorised into risk-averse, risk-seeking / lovers and risk-neutral which represent a working definition of risk attitude (Murray-Webster & Hillson 2008). Risk-averse people are those who are highly uncomfortable with the uncertain outcome; this may guide them to sacrifice expected profit to avoid risk. They are willing to accept a lower average income to avoid or reduce threats (Murray-Webster and Hillson 2008). Risk seekers are quite interested with uncertainties, and they do not have a desire to avoid or reduce threats. They perceive risk as a profitable chance and thus, they seek to pursue the venture and accept losses to take their chances (Murray-Webster and Hillson 2008). Between the two

extremes attitudes, we have risk-neutral individuals who are uncomfortable with uncertainty in the long term; therefore, they are able to take whatever necessary short-term activates to gain a certain long-term outcome. Risk neutrality is exhibited when the decision maker are able to eliminate the threat (Murray-Webster and Hillson 2008).

Most of the studies in Kenya that have examined attitudes of farmers have failed to consider farmers' attitude towards risk (Korir 2011; Njue *et al.* 2014; Tongruksawattana 2014). Furthermore, previous studies on indigenous chicken have mainly concentrated on production and marketing aspects of birds with limited information on the behavior of farmers towards risk on indigenous chicken (Ochieng *et al.* 2012; Olwande *et al.* 2013; Bett *et al.* 2012). Therefore this study attempts to fill the gap by specifically examining the farmers attitude towards risk on indigenous. Risk has an important implication on agricultural production in that it affects farmers' decisions on production and marketing of the farm produce. Knowledge on risk attitude of indigenous chicken farmers' attitude towards risk will be of great importance to policy makers and researchers useful information to develop appropriate strategies for indigenous chicken development. The information will also be beneficial to insurance firms that are targeting the agricultural sector.

METHODOLOGY

Study Area

The study was conducted in four counties in the Nyanza region namely; Siaya, Kisumu, Homabay and Migori. The indigenous chicken population in the counties is 994247, 852495, 1094776 and 1285736 respectively (Kenya National Bureau of Statistics, 2009). The human population in the counties is 842304, 968909, 963794, and 917170 respectively (Kenya National Bureau of Statistics, 2009). The region is located between latitudes 0° 15'N and 1° 45'S, longitudes 35° 15' E and 34° E, and borders Lake Victoria from the east, Western Province to the north, Rift Valley Province to the east and Tanzania and Uganda to the south and west respectively (GOK, 2012). The total study area is 12,646 km^2. The main source of livelihood in Nyanza is mixed farming. Other livelihood strategies include fishing, cash crop farming and casual labor (GOK, 2012). The study area is characterized by bimodal rainfall pattern sufficient for agricultural production with peaks experienced in April/May and October/November. The temperatures vary within the counties depending on altitude and proximity to Lake Victoria. The annual minimum temperatures range from 17°C to 18°C and maximum temperatures range between 27° C and 34.8°C.

Target Population

Target population refers to the population to which the researcher wants to study (Mugenda Mugenda 2003). The study was interested with farmers in the region who keep

indigenous chicken for commercial purposes (more than 50 birds). Most insurance company require indigenous chicken farmers to insure a minimum of 50 birds (SME Resource Centre). A list of 1520 indigenous chicken farmers was provided by TECHNOSERVE (an NGO that promotes business solutions to poverty in developing world by linking people to information, capital and markets) which operates in Nyanza region. The researcher purposively selected those who keep more than 50 birds forming a target population of 598 farmers.

Data Collection

This study utilised primary data collected using structured questionnaire and complemented with interview schedule. The data collected included household characteristics (age, gender, education, income / expenditures, employment status of household head and spouse; farm size, household size, employment and business status of household members, distance to nearest chicken market; number of household dependants); information on chicken production (the flock size, flock structure (hens, cocks, and chick) and their prices), types and cost of feeds, cost of labour, types and cost of drugs and average weight of chicken which was used to estimate the risk aversion coefficient for the indigenous chicken farmers. Face to face interviews were employed to gather information from the IC farmers. Five enumerators were recruited for the field suvey. The enumerators were trained in a workshop for 3 days before administering the survey. The training was to brief them on the purpose of the study and details of each question and the interviewing technique. The pre test was performed on the last day of the workshop to ensure that the enumerators understood clearly all questions in the questionnaire. The researcher sought help from TECHNOSERVE, who gave a list of IC farmers, their contacts and group leader. The researcher requested the group leader to brief the group members about the research. The IC farmers who were willing and had more than 50 birds were gathered together in central location, such as the group leader's house, on appointed date and time. However, some interviews took place at the farmers' houses.

Sampling Procedure

A multistage sampling procedure was used to select respondents for the study. The multistage sampling method was helpful in dividing and narrowing down the study into smaller study units. In this approach, at level one, purposive sampling was used to select four counties where TECHNOSERVE operates in Nyanza region. At level two, indigenous chicken farmers who keep more than fifty birds were selected for the study. Sixty (60) respondents were randomly selected from each County.

Sample Size Determination

Determination of sample size in any research is important. According to literature, the appropriate sample size for a population-based survey is determined largely by three factors: (i) the estimated prevalence of the variable of interest, (ii) the desired level of confidence and (iii) the acceptable margin of error. Other factors such as resources (physical, human, financial and time) availability and researcher preference are also taken into consideration when determining sample size.

Yamane (1967) suggested a simplified formula for calculation of sample size from a population. According to him, for 95% confidence level and p=0.5 , size of the sample should be

$$n = \frac{N}{1+N(e)^2} \dots\dots\dots\dots\dots\dots\dots\dots Equation(1)$$

n = required sample size N= Population. e= margin of error at 5% (standard value of 0.05)

Taking the study target population of 598 IC farmers, the sample size of the study was as follows:

$$n = \frac{598}{1+598(0.05)^2} = 240 \dots\dots\dots\dots\dots\dots Equation\ (2)$$

Data Analysis

Estimation of Risk Attitudes of Indigenous Chicken Farmers

The safety-first principle proposed by Kataoka (1963), modified by Moscardi and de Janvry (1977), used in (Aye & Oji 2005; Ajemotobi & Binuomote 2006 ; Salman *et al.* 2010 Chinwendu *et al.* 2012) was used to estimate the risk attitudes of indigenous chicken farmers. This principle assumes that the individual's objective is to minimize the probability of experiencing variability (a shortfall) in output or income below a certain initial level, (specified levels of disaster). The risk aversion coefficient (K) for each farmer was computed as presented in equation 1.

K = 1/ γ {1- PiXi|Pf1μy} …………..……………*Equation (3)*

Where: γ = coefficient of variation of output (market price); *Pi* = input price; *Xi* = average quantity of the most significant input for each respondent; *P* = market price of output and *f*1 = the elasticity of production, μy = the mean of output;

The coefficient of variation of output is given by

γ =Sy/μy ……………………………………..*Equation.(4)*

where Sy = the standard deviation of output and μy is as described in equation 3.

Elasticity of production was the coefficient of the most significant input in indigenous chicken production

Following Moscardi and De Janvry (1977), the risk coefficient *K* was used to classify indigenous chicken farmers into four distinct groups: Risk preferring if K < 0; Low risk averse if 0<K < 0.4; Intermediate risk averse if 0.4≤K ≤1.2; High risk averse if 1.2 <K < 2.0

RESULTS AND DISCUSSIONS

Farmers' demographic information

The indigenous farmers' demographic information is shown in Table 1 below. Majority (76.3%) of the farmers sampled in this study were male while 23.8% female. The male also engaged in poultry production due to realization that poultry keeping was a profitable venture. This study contradicts results by Ahlers, *et al.*(2009) that Sub-Saharan Africa indigenous chickens are owned and managed by women and children and often essential part of female-headed households. According to Gueye (2009), promotion of indigenous chicken production economically empowers the rural youth and women. The farmers who had post-secondary education and above were 75.4% while the ones with Kenya Certificate of Primary Education were 24.6% .This implies that most of the indigenous poultry farmers had considerable level of formal education background that could enhance human capital development. Education catalyses the overall behavior change for quick adoption of new technology for improvement of any production enterprise (Mandal *et al.,* 2006). Studies by Alubi and Aruna (2006) and Ndahitsa (2008) found that level of education determines the quality of skills of farmers, their allocative ability and how well informed they are to the innovation and technology around them. 77.5% of the respondents were indigenous chicken farmers who were also engaged in other income generating activities while 22.5% were salaried. The IC farmers were involved in various income generating activities so as to sustain their livelihood.

Table 1: Farmer demographic information

Demographic	Number of farmers (n = 240)	Percent
Gender		
Male	183	76.25
Female	57	23.75
Level of education attained		
Primary certificate	59	24.58
Secondary certificate and above	181	75.42
Main occupation of the household head		
Farming &salaried	54	22.50
Farming & other money generating activities	186	77.50
Age		
≤ 40 years	39	16.25
>40 years	201	83.75
Family size		
≤ 8 members	207	86.25
> 8 members	33	13.75
Land size		
≤ 2.5acres	172	71.67
> 2.5acres	68	28.33
Farming experience		
≤ 4 years	199	82.92
>4 years	41	17.08
Production system		
Semi intensive	195	81.25
Extensive	45	18.75

Majority of the IC farmers (83.75%) were above 40 years and had kept poultry for an average of 4.00 years. Age can be used as a proxy for experience (Luong and Hèbert, 2009). More experienced farmers are more likely to manage the farm better and make more informed decisions. More experience would make one to be more efficient, have better knowledge of climate condition, market situations and thus expected to run a more efficient and profitable enterprise (Oluwatayo *et al.,* 2008). According to Onyebinama (2004) previous experience in farm business management enables a farmer to set realistic time and cost targets, allocate and combine and utilize resources more efficiently and identify production risks

Majority (86.25%) of the IC farmers had a family size of ≤ 8 members with an average 6 members. This implies that there was supply of family labor in the production of the IC. Majority of the IC farmers (71.67%) owned land ≤ 2.5 acres. These findings agree with the study done by UN, (2011), indicating that most small-scale farmers owned less than one hectare of land. Increase in the total land size increases the area for scavenging hence increasing productivity (Nduthu, 2015). 81.3% of the IC farmers practised semi intensive production system 18.7 % used extensive production system. This could be reason why most farmers were keeping the IC for commercial purposes.

Indigenous chicken flock size, structure, prices and dynamics

The farmers who practiced extensive production system had an average of 60 birds while farmer who kept birds under semi intensive had an average of 131 birds. The average price of mature cock was Ksh. 690.46 while that of mature hen was Ksh.524.69 as shown in Table 2 below. Comparison of the prices of cock to the prices of hens by using paired sample t-test showed that the prices of IC cock was significantly higher than the prices of IC hen (t = 17.943, P = 0.01). This could be due to the fact that coks are bigger in size compared to the hens.The farmers kept the IC mainly for income generation otherwise fewer chickens would have been sufficient for home consumption. The major source of replacement stock in both production systems was hatching within the farm. This means that most households were raising their own breeding stocks. However some of the IC farmers bought chicks to replace the sold, consumed or death stock. (Table 2)

Table 3 : Regression coefficients for factors of production that influence monthly income from sale of IC

Variable	Extensive System		Semi Intensive		Extensive and Semi Intensive production System	
	Coefficient[a]	s.e	Coefficient[a]	s.e	Coefficient[a]	s.e
Ln (cost of chicks per month (X_2))	0.518	0.556	0.315	0.339	0.290	0.292
Ln (cost of feeds per month (X_1))	-0.007	0.102	0.184***	0.069	0.136**	0.058
Ln (cost of labour for per month (X_3))	0.062	0.094	0.076	0.053	0.479*	0.291
Ln (cost from drugs per month (X_4))	-0.410	0.633	0.453	0.333	0 .068	0.047
Ln (cost of depreciation per month (X_5))	0.037	0.060	0.060	0.039	0.058*	0.033
Constant	5.985	1.298	1.185**	0.473	1.561***	0.413
R^2	0.056		0.617		0.585	
Adjusted R^2	-0.065		0.607		0 .577	
F – value	0.461		60.923***		66.095***	
No. of observation	45		195		240	

[a]***, **, * = coefficients are significant at 1%, 5% and 10% level respectively

Table 2: Indigenous chicken flock size, structure, prices and dynamics

Variable	Extensive production system (n=45)	Semi intensive production system (n=195)	Extensive and Semi Intensive Production Systems(n=240)
Flock structure(Mean in numbers)			
Hens	41.00	90.00	36.57
Cocks	17.90	40.00	81.20
Flock size	59.37	131.33	117.25
Average price of mature IC (Mean in Kshs)			
Hens	493.33	531.92	690.46
Cocks	615.56	707.75	524.69
t-value			17.943***
Main purpose of keeping IC (%)			
Commercial	97.8	95.9	96.3
Subsistence	2.2	4.1	3.7
Source of Chicks (%)			
Own farm	66	57	58.69
Purchase	34	43	41.31

Risk attitude of the Indigenous Chicken farmers

The estimates of coefficients for various input variables of the production function are presented in the Table 3. The model for both production systems had an adjusted R-squared of 0.577 implying that about 58 percent of the variation in income from the sale of the IC is explained by the explanatory variables included in the model. The F-statistics was significant at 1% level of significance meaning that overall, the variables included in the production model are jointly significant in explaining the model.

In the extensive production system there was no significant input in the production process. The cost of feeds was the only significant input in the production process in the semi intensive production system. The cost of feeds, labour and depreciation per month were found to be the significant inputs of the IC production process in the model with both production systems. Since the cost of feeds was the most significant input in the production

process of semi intensive production system and the model for both production systems, it was used in determination of the risk attitude coefficient (K) for each farmer. Previous studies have used feeds in determination of the risk attitude since it is the most consistent input in poultry production and accounts for largest proportion of the variable cost (Ajetomobi & Binuomote 2006; Salman *et al.* 2010). Chinwendu (2012) found stock to be the most significant input and used it in estimation of the risk attitude of the poultry farmers in Nigeria.

The distribution of the IC farmers by their level of risk aversion is summarized in Table 4. All the indigenous poultry farmers were risk averse having intermediate risk aversion values centred around 0.58. This result is in line with those of Ajetumobi and Binuomote (2006); Salimonu & Falusi (2009); Chinwendu *et al.* (2012) who also found that majority of the poultry farmers they were assessing were risk averse. A risk averse attitude is associated with managerial decision that tradeoff a lower risk or variation in income for higher income. This could be the reason why the IC farmers were engaged in various income generating activities rather than investing only on chicken production.

Table 4 : Level of risk aversions

Risk level	Frequency	Percentage
Risk preferring K < 0	0	0
Low risk averse 0<K < 0.4	0	0
Intermediate risk averse 0.4 ≤ K ≤ 1.2	240	100
High risk averse 1.2 <K < 2.0	0	0
Total	240	100

CONCLUSION AND RECOMMENDATION

The study determined the farmers' attitude towards risk on indigenous chicken in Nyanza region, Kenya. The cost of feeds was the most significant input in the IC production. All the IC farmers exhibited intermediate risk aversion implying that the indigenous chicken farmers accepted a

lower average income for a lower uncertainty. The farmers were after reducing risk rather than maximising profits and therefore committed less resources in the production of chicken and engaged in various income generating activities Based on the findings above it is recommended that packages of technological and institutional practices should be tailored towards the risk attitude of the farmers for successful implementation of such development programmes. There is need to develop appropriate agricultural policies that can help reduce risk such as agricultural insurance.

ACKNOWLEDGEMENT

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