RELATIONSHIP BETWEEN BIOSECURITY PRINCIPLES AND CONSUMER ATTITUDES

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Abstract

Indigenous chicken abound in Kenya and are produced under minimal/very low levels of biosecurity principles resulting in low productivity. Consumers however exhibit high preferences indigenous chicken products. The aim of this research was to establish the relationship biosecurity principles and intentions to consume indigenous chicken in Kisumu City, Kenya. The subaim was to test the significance of this relationship, if any. Using a descriptive research design, a questionnaire was administered on 281 respondents (females=48%) in Kisumu City (78% response rate), and relationship established through Spearman rank correlation. Observed low and insignificant correlations for management of the flock = .064 (p=.296); control ofincoming animals = .080 (p=.185); and control of other animals =.094 (p=120). Only control of in- and out-going materia l=.127 (p=.035) had a significant correlation with intention to consume. Concluded there is no significant relationship between biosecurity principles and intention to consume indigenous chicken. Thus, the puzzle linking biosecurity and preferences for indigenous chicken still exists given this evidence. The role of the government in providing information on biosecurity cannot be gainsaid as it creates impetus to demand high quality indigenous chicken products. Market mechanisms cannot fully reveal the underlying relationships between biosecurity principles and intention to consume indigenous chicken. Hence need for further research on a wider area utilizing non-market methods like contingent valuation and/or choice experiments to unlock these relationships.

Keywords: Spatial engagement, Non-market methods, Information, Food safety

Introduction

Indigenous chicken accounts for 81% of 31,827,529 total poultry population in Kenya and supports livelihoods of over 21 million people in rural areas (Oparanya, 2009; MOLFD, 2007; Nyaga, 2007a; Omiti, 2011). Kenya's indigenous chicken productivity, expressed in terms of egg production, egg size, growth and survival of chicks, is low compared to the rest of the world. Hens lay about 45 eggs a year, mean egg weight is approximately 47.4g, hatchability is low at 70%, birds take 6-7 months to attain a maturity size of 1.5 kg, the resultant carcass is about 0.5kg, chick mortality is high at 44%, disease outbreaks is high at 44%, predation is at 8%, inbreeding is at 8.3% which is higher than accepted levels 1-2%, and feed quality is poor (Brannang and Pearson 1990; Henson, 1992; Alemu, 1995; Alemu and Tadelle, 1997; Magothe *et al*., 2006; Mogesse, 2007; Demeke, 2007; Okeno, Kahi and Peters, 2010; Olwande *et al.*, 2010).

Biosecurity means security from transmission of infectious diseases, parasites and pests to a poultry production unit (Amass and Clark, 1999; Permin and Detmer, 2007). A biosecurity plan can be implemented to attain three strategic objectives: bio-exclusion or external biosecurity; bio-management or internal biosecurity; and bio-containment (CSHB, 2010). Permin and Detmer (2007) presented four biosecurity principles. These are management of the flock, control of incoming animals, control of in- and out- going material, and control of other animals. These principles can be executed by performing certain activities in and around the poultry flock/house. Biosecurity measures can be instituted by ensuring poultry feeds are free of pathogens and mycotoxins such as aflatoxins (Owaga *et al.*, 2011). Water, air, medication and litter material equally must be clean and permit no entry of pathogens. Humans, vehicles and equipment entering and/or leaving the poultry unit must be disinfected thoroughly. Lastly, day old chicks from hatchery, chicks from other sources (e.g. hens) and other chickens must be from secure and verified sources. The flock must be separated by age.

Most studies reveal that indigenous chicken is produced under minimal or very low levels of biosecurity principles, as is evident in its low productivity (Nyaga, 2007a,b; Guèye; 2009). Njue *et al*, (2002) study in Western Kenya showed that with high population concentrations of humans and poultry, low hygiene standards, and a culture that promotes close contact with chicken poses very high biosecurity challenges especially during avian disease outbreaks. Guèye (2002) posited that there are usually humanized relationships between humans and poultry. Thus small poultry flocks are kept by producers; and humans and poultry often live in the same house. Aini (2000) showed that biosecurity practices are very important to indigenous chicken producers.

This poses possible human health risks such as yeast infections, highly pathogenic avian flu (HPAI), gastroenteritis, and *Campylobacter* infections (Lehner, Schneck, Feierl, Plees, Deuts, Brandl, and Wagner, 2000; Padungton and Kaneene, 2003; Beeckman and Vanrompay, 2009). In Kenya, *Campylobacter* is prevalent in 77% of poultry products in retail markets (Osano and Arimi, 1999).

Moreover, most indigenous chicken evade the inspection loop before consumption (USAID, 2012; Mutua *et al.*, 2010). The Meat Control (Poultry Meat Inspection) Regulations of 1975 (Meat Control Act, 2012) provides that all poultry intended for human consumption shall be inspected both at the ante-moterm and post-moterm. The intent is to select birds for dressing and to condemn carcasses or body parts that are unfit for human consumption. This poses the risk of transferring any poultry diseases to humans.

Consumers, on the other hand, exhibit high preferences for indigenous chicken and are willing to pay a premium price (Bett *et al.*, 2011). They were willing to pay 23.26% per kg more for indigenous chicken meat and 41.53% for eggs. A USAID (2010) study showed that consumers generally prefer indigenous to exotic bird breeds in the East African Region. Given this biosecurity principles situation in Kenya, consumers' preferences for indigenous chicken is paradoxical. Literature does not offer any relationship between biosecurity principles and intention to consume indigenous chicken. The aim of this research was to establish the relationship biosecurity principles and intentions to consume indigenous chicken in Kisumu City, Kenya. The subaim was to test the significance of this relationship if any.

Methodology

In order to fulfill this aim, a descriptive study was designed implemented through the survey method. A questionnaire was constructed to elicit respondnt beliefs on the biosecurity principles. A sample of 360 respondents was drawn using systematic sampling technique from residents of Kisumu City and the questionnaire administerd in July 2013. Data were analyzed using Spearman's rank correlation.

Results and Discussion

A total of 281 useful questionnaires were returned representing a 74% response rate. This was better that Masalu and Astrom (2003) study that reported a 58% response rate in their consumer related study at Dar es salaam University in Tanzania. Cronbach's Alpha test was performed to assess the instrument's reliability. It was found that the instrument was reliable at an Alpha of .936 well above the cutoff of .70 for business studies (Sekaran and Bougie, 2009). Questionnaire validity was confirmed by conducting the Bartlett's test of sphericity (Field, 2005; Roberts-Lombard *et*

al., 2013). The result of the test was a chi-square of 6394.688 with 2485 degrees of freedom. It was significant $p < 0.05$ level. From this result, it was evident that the instrument was valid, since the significant level was 0.000 (Roberts-Lombard *et al*., 2013).

The subject to item ratio was 70:1 indicating sampling adequacy (Castello and Osborne, 2005). Kaiser-Meyer-Olkin Measure of sampling adequacy was perfomed which resulted in a value of $.795$ for the study. According to Field (2005) and George and Mallery (2009), a KMO value between .7 and .8 is good.

Descriptive Statistics

Table 1 below presents the respondent's descriptive statistics. Mean average income was $M = 1.57$ $(SD = 1.053)$ meaning average income was within the KSh 20,000-39,999 range. Mean age was $M = 1.89$ $(SD = .714)$ meaning the average age fell between 21-30 years. Mean terminal education age (TEA) was M=1.48 (SD=.687) meaning it fell below 16 years. Mean gender M=.48 (SD=.5), (female=1, male=0), Marital status $M = .48$ $(SD = .5)$ (married=1, single=0), Mean occupation was $M = .47$ $(SD = .5)$ (employed=1, unemplyed=0) respectively. Mean residence was $M = 1.47$ $(SD = .622)$ signifying the respondents resided in the urban part of the city.

Table 1: Respondent Descriptive Statistics

	N	Range	Min	Max	Mean		Std. Dev	Variance
					Statistic	Std. Error		Statistic
Average Income (KSh)	281	5	1	6	1.57	0.063	1.053	1.110
Age in years	281	4	1	5	1.89	0.043	0.714	0.510
Terminal Education Age (Years)	281	4	1	5	1.48	0.041	0.687	0.472
Gender	281	1	0	1	0.48	0.030	0.500	0.250
Marital status	281	1	0	1	0.48	0.030	0.501	0.251
Occupation	281	1	0	1	0.47	0.030	0.500	0.250
Residence classification	281	2	1	3	1.42	0.037	0.622	0.387
Preferred Purchase Location	241	7	1	8	3.19	0.129	1.999	3.994
Cultural inclination choice	281	1	0	1	0.88	0.02	0.331	0.109
Valid N (listwise)	241							

Source: Survey, 2013.

Correlation Analysis

Spearman's rank correlation is a non-parametric measure of strength of association between two ranked variables. Its choice was based on the assumption that Likert scales are ordinal (Jamieson, 2004; Norman, 2010). It was performed to fulfill the research aim. The descriptive statistics of the correlated variables is presented in Table 2 below.

Table 2: Biosecurity Principles Descriptive Statistics

	N	Range	Min.	Max.	Mean	Std. Dev.	Variance
Intention to consume indigenous chicken	281	1	0	1	.45	.498	.248
BP1: Management of flock	271	6	1	7	4.68	1.853	3.432
BP2: Control of incoming animals	275	6	1	7	4.78	1.741	3.033
BP3: Control of in and out going material	275	6	1	7	4.81	1.761	3.101
BP4: Control of other animals	276	6	1	7	4.80	1.809	3.273
Valid N (listwise)	271						

Source: Survey, 2013.

The intention to consume indigenous chicken was measured on a binary yes/no response scale coded 1 and 0 respectively. The four biosecurity principles were on a belief scale anchored between 1 and 7 respectively. Mean intention to consume indigenous chicken was, $M = .45$ $(SD = .498)$ revealed that less than half of the respondents expressed their intention to consume indigenous chicken during the following week after the interview. Examining frequencies for this item (Table 3 below), confirmed that indeed that less than half the respondents (45%, $N = 281$) expressed their intentions to consume indigenous chicken.

Table 2 above showed that the biosecurity principles had the following means: management of the flock $M = 4.68$ $(SD = 1.853)$; control of incoming animals $M = 4.78$ $(SD = 1.741)$; control of incoming and outgoing material $M = 4.81$ $(SD = 1.761)$; and control of other animals $M = 4.80$ $(SD = 1.809)$ respectively. The respondents were presented with the four biosecurity principles that might influence their preferences for indigenous chicken. These results reveal that respondents indicated that the biosecurity principles were somewhat true of what they believed.

Table 3: Intention to Consume Indigenous Chicken Frequencies

		Frequency	Valid Percent	Cumulative Percent
Valid	N0	155	55	55
	YES	126	45	100
	Total	281	100	

Source: Survey,2013

A two-tailed Spearman's Rank Correlation was performed to fulfill a specific aim of the study and for hypothesis testing. The results are presented in Table 4 below.

Table 4: Biosecurity Principles Correlations

			Intention to consume	BP1	BP2	BP3	BP4
Spearman's rho	Intention to consume indigenous chicken	Correlation Coefficient	1.000				
		Sig. (2-tailed)	.				
		N	281				
	BP1: Management of flock	Correlation Coefficient	0.064	1.000			
		Sig. (2-tailed)	0.296	.			
		N	271	271			
	BP2: Control of incoming animals	Correlation Coefficient	0.080	.573**	1.000		
		Sig. (2-tailed)	0.185	0.000	.		
		N	275	271	275		
	BP3: Control of in and out going material	Correlation Coefficient	.127*	.475**	.519**	1.000	
		Sig. (2-tailed)	0.035	0.000	0.000	.	
		N	275	271	275	275	
	BP4: Control of other animals	Correlation Coefficient	0.094	.379**	.465**	.429**	1.000
		Sig. (2-tailed)	0.120	0.000	0.000	0.000	.
		N	276	271	275	275	276

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Survey, 2013.

According to Table 4, the results of the correlation analysis showed that intention to consume indigenous chicken correlated positively to management of the flock $r = .064$ ($p = .296$), control of incoming animals $r = .080$ ($p = .185$), control of incoming and outgoing materials $r = .127$ (.035) and control of other animals $r = .094$ ($p = .120$) respectively. The positive correlation indicated that belief in biosecurity principles to be true was positively associated with the respondents' intention to consume indigenous chicken. These correlations were however very low $r < .10$ and insignificant. Only one principle significantly correlated with intention to consume indigenous chicken at 95% confidence level. Thus the null hypothesis for Spearman's correlation at 95% confidence level H_o*: There is no significant relationship between biosecurity principles and intentions to consume indigenous chicken in Kisumu City* was accepted. This might partly explain the high preferences for indigenous chicken (Bett *et a1*., 2011) with prevailing low adoption of biosecurity principles (Nyaga, 2007b). The biosecurity principles however showed positive but significant correlations at $p = .000$ pairwise at 99% confidence level.

Pagani et al (2008) have strongly argued that to increase the chances of effectively improving biosecurity, it is necessary to: work at different levels and with different actors; show the advantages for producers who require direct benefits; involve consumers in order to constrain producers to improve their products; and implement information, training and awareness campaigns. They suggest involvement of consumers in food safety leading to bio-containment. They assert that direct interaction between producers and final consumers is rare; interaction between the two is usually via one or more mediators. Thus mobilizing interested health-conscious consumers who are willing to pay a little more for drug-free birds will create a demand for quality poultry products. Their work has averred the spatial engagement between producers and consumers. This might explain the disparity between biosecurity principles and intentions to consume indigenous chicken.

Manzella (2007) states categorically that the ultimate objectives of *biosecurity* at the national level are to protect domestic agricultural production and natural resources from biological hazards and to safeguard the health of consumers in the food chain. Biosecurity is a strategic and integrated approach that encompasses the policy and regulatory frameworks to analyze and manage risks in the sectors of: food safety; animal life and health; and plant life and health, including associated environmental risks. Thus, it is absurd if consumers cannot readily relate their consumption intentions to biosecurity.

Manzella (2007) further stated that in Kenya, the Food, Drugs and Chemical Substances Act (Chapter 254, 1970) makes provision for the prevention of adulteration of food, drugs and chemical substances. Foods for which there are prescribed standards must conform to such standards. Subsidiary legislation under the act makes provisions for food hygiene, and has addressed the issues of food labeling, additives and standards. Meat control is also the subject of specific legislation. The Meat Control Act (Chapter 356, 1973) provides standards for slaughterhouses; storage and transportation of meat and meat products intended for human consumption; meat processing establishments; and import and export control over meat and meat products. Regulations specify standards to be observed in meat production as well as methods of packaging, labeling and transport. The Ministry of Agriculture implements both the Food, Drugs and Chemical Substances Act and the Meat Control Act. Given existence of national biosecurity policy, one readily concurs with Pagani et al (2008) on the need to organize consumer campaigns to create biosecurity awareness on indigenous chicken.

The relationship between biosecurity principles and intention to consume can be thought of in terms of production possibility frontier (McInerney, 1991; Bennett, 1995; Trewin, 2001). There are trade-offs

between utility from biosecurity principles and those from intentions to consume. The society desires an equilibrium point where their consumption interests balance off with biosecurity principles. Thus an economic social cost-benefit analysis framework for biosecurity principles should be conducted to assess this (Trewin, 2001). This trade-off cannot be left for market forces alone. The willingness to pay premuim prices for indigenous chicken (Bett et al., 2011) is a situation where value is revealed in market transaction through hedonic pricing. This price incorporates other aspects such as biosecurity. However, this premium may be reflecting just the opportunity cost to consumers, that is, what they are paying, and not their greater willingness to pay (Trewin, 2001). Moreover, less efficient production systems (e.g. accounting for higher levels of mortality) evidenced in low productivity (Teketel, 1986) requires the buyer to cover production costs for the producer to survive.

The contraticti̇on still exists: a key reason for purchasing free-range eggs in some Austrlian Consumer Survey (Rolfe, 1999) was "better for environment and health." Evidence from Kenya is that these eggs might be a health hazard (Osano and Arimi, 1999). This contradiction needs immediate resolusion.

Conclusion

This study concluded that there is no significant relationship between biosecurity principles and intention to consume indigenous chicken. Thus, the puzzle linking biosecurity and preferences for indigenous chicken still exists given the evidence at hand. Two recommendations can be made:

1. The role of the government in providing information on biosecurity cannot be gainsaid. It has the capability of creating consumer awareness thus demanding high quality indigenous chicken. This will improve the situation at both production and consumption ends.
2. Market transactions do not fully reveal the underlying relationships between biosecurity principles and intention to consume indigenous chicken. Thus there is need for further research utilizing non-market methods such as contingent valuation method and/or choice experiments to unlock these relationships.

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