CONSUMERS' PREFERENCE ATTRIBUTES FOR TROPICALLY ADAPTED IMPROVED CHICKEN IN NJOMBE AND MOROGORO REGIONS, TANZANIA

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ABSTRACT

Generally in Tanzania consumers prefer local chickens and pay premium prices compared to other chickens due to the perception that local chicken tastes better, nutritious and organically raised. However, productivity levels of local chicken are low resulting to low outputs hence limiting their potential for commercialization. For that reason, the African Chicken Genetic Gain program has recently introduced tropically adapted improved chicken including Sasso, Kuroiler and Black austrolop strains which have higher productivity levels in terms of growth rate and eggs production than local chicken to enhance income generation to rural farmers. The introduction or development of any new product in the market needs to take into account consumer's preference analysis because in determining the demand for a product it is useful to think of consumers not as purchasing the product, but its attributes that provide utility. Therefore, this study sought to analyze consumer preference attributes for tropically adapted improved chicken in Morogoro and Njombe regions. Multistage sampling technique was employed to select 120 respondents in Morogoro and Njombe regions. Results of Kendall coefficient indicated that consumers were in agreement by 67% on attributes of tropically adapted improved chickens which influence purchasing and consumption decision. The attributes were, weight of chicken, price of chicken, sex of chicken, fat content, tenderness, plumage colour and taste of chickens in that order. Results of hedonic price model indicated that large sized chicken, male chicken, tender, low fat chicken and mixed colour chicken significantly received premium prices. Monthly income, household size and marital status significantly influenced the willingness to pay for the chicken. Farmers in the study regions and beyond should strategize their production practices by adopting keeping of the improved strains by enhancing preferred attributes so as to benefit from high revenue realized from premium prices for these attributes.

DECLARATION

I, Elias Rutashobya Muhikambele, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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The above declaration is confirmed by;

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Dr. Fulgence Mishili Date

(Supervisor)

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DEDICATIONS

To my lovely parents Vedasto and Faith Muhikambele and my family.

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LIST OF ACRONYMS AND ABBREVIATION

ACGG	African Chicken Genetic Gain
FAO	Food and Agriculture Organization of United Nations
GDP	Gross Domestic Product
ILRI	International Livestock Research Institute
NBS	National Bureau of Statistics
PASS	Private Agricultural Sector Support
PIN	People In Need
RIU	Research Into Use
SAEBS	School of Agricultural Economics and Business Studies
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
TZS	Tanzania Shillings
URT	United Republic of Tanzania
WB	World Bank

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Worldwide, consumption surveys indicate that poultry is the second largest consumed meat after pork in which it accounts for approximately 33% of world meat intake, serving as the chief meat in consumer diets in many low to middle income countries (FAO, 2012). Poultry production is reported to contribute almost 30% of agricultural output in most African countries economy (Akinola and Essien, 2011). About 80% of the poultry stocks in many developing countries account for local chicken which are widely distributed in rural areas due to their high degree of adaptability to prevailing conditions in rural environments, disease tolerance, ability to breed naturally and ability to survive on little inputs and adjust for fluctuations in feed availability (Adedeji *et al.*, 2008; Ajayi, 2010). Local chickens require little start-up investment and have negligible inputs, meaning that almost any output (meat or eggs) results in profit (deBruyn *et al.*, 2015).

In Tanzania, poultry contribute 16% of livestock GDP, 3% of agricultural GDP and 1% of national GDP (NBS, 2012). According to FAO (2012) the average consumption of chicken in Tanzania was about 0.7 kg chicken meat and 13 eggs per capita per year which is relatively low in comparison to other African countries and the rest of the world which consumes about 6.8 kg and 108 eggs per capita per year. In Tanzania, commercial poultry keeping is mostly carried out in urban areas and it accounts for about 80% of the poultry meat and eggs consumed in urban areas, on the other hand, local chickens are raised mainly in rural areas and estimated to make up 100% of the rural and 20% of urban poultry meat and eggs consumption (Kaijage, 2015). Specifically, the demand for local chicken in Tanzania is high compared to other breeds as most people in urban centers are

willing to pay premium prices for the chicken due to the perception that local chicken tastes better, nutritious and perceived health benefits (PASS, 2012).

Nevertheless, productivity levels of local chicken are low attributed to their low genetic potential, prevalence of diseases and predators, limited feed resources, constraints related to institutional and socio-economic and limited skill management practices resulting to low outputs (40 to 60 eggs per year and 1.5 to 1.7 kg body weight at maturity) leading to low income generation to chicken farmers (Solomon *et al*., 2013; Nebiyu *et al*., 2013; Nigussie *et al*., 2010). In addition to that, productivity of local chickens is relatively low due to poor feed conversion efficiency, low adoption of modern technologies and genotype (Khobondo *et al.,* 2015).

The low genetic potential of local chickens has prompted researchers to seek for alternative breeds which are deemed to be better in productivity and yet adaptable to rural environment RIU (2011). One of these efforts is the attempt by the African Chicken Genetic Gains (ACGG) project whereby in 2015 various strains of improved chicken genetics including Black Australorp, Kuroiler and Sasso were introduced and tested under smallholder production environment in various agro-ecological zones of Tanzania mainland. The chickens emerged from combined new genetics, improved local breeds and enhanced delivery systems to produce high-producing but low-feed-input birds, pre vaccinated and suited to local conditions (Dessie, 2015).

1.2 Problem Statement and Justification

Due to high productivity of the improved chicken compared to local chicken, the project expects an increase in supply of chickens in the country. But there is a general perception both in rural and urban areas that improved breeds are usually loaded with drugs leading

to poor eating quality compared to local chickens (Mbaga, 2014). Despite, the fact that the introduced tropically adapted improved chickens are reared under similar systems to local chicken, the influence of their attributes in attracting consumer purchasing and hence willingness to pay premium prices for the chicken is not known. In Africa previous programs that were implemented for the purpose of introducing cockerels of modern breeds have mainly failed because they did not take into account consumers' preferences regarding the various poultry traits (Sodjinou *et al*., 2014).

In addition to that only few studies on consumers' preference attributes for poultry traits have been performed in Tanzania. For instance, Queenan *et al*. (2016) reported that, when purchasing local chickens, consumers often focused on their size, estimated weight and overall health. The study however did not address the influence of mentioned choice attributes on price of chickens which is important to farmers because PIN (2015) reported that, most of small poultry farmers do not know how to manage their chickens to attract premium prices and do not have access to regular price information.

There is therefore a knowledge gap on the acceptability of the attributes of the improved chicken in the market. It is expected that the results of this study will inform and guide farmers who are rearing tropically adapted improved chickens on the management practices and production methods to adopt in order to enhance the attributes that fulfills market requirements. In this regard, farmers will benefit most financially. Consequently, traders will be able to adopt strategies in transportation, handling, storage and transformation in order to improve retail level chicken prices through emphasis on retail level attributes that are important to end users.

1.3 Overall Objective

The overall objective of this study was analysis of consumer's preference for tropically adapted improved chickens attributes in Morogoro and Njombe regions.

1.3.1 Specific objectives

i. To identify and rank attributes of tropically adapted improved chickens that consumers prefer and use in the purchasing decision.

ii. To determine the influence of preferred attributes of tropically adapted improved chickens on price of chicken.

iii. To determine the influence of social-economic characteristics of consumers on price of chickens.

1.3.2 Research hypothesis

i. There is no general agreement among consumers in their rankings of preferred attributes of tropically adapted improved chickens that influence their purchasing decision.

ii. Preferred attributes of tropically adapted improved chicken do not have significant influence on the price of chickens.

iii. Social-economic characteristics do not have significant influence on the price of chickens.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

According to the Lancaster theory (Lancaster, 1966), consumers derive utility from attributes of a good rather than the good itself. Lancastrian consumer theory suggests that the utility consumers derive from a product is actually equal to the combined utilities the consumer derives from the attributes of the product (Loureiro and Umberger, 2007). According to the theory, consumers often pay a premium price for desired attributes of a product (Lancaster, 1966). The underlying assumption postulates that products consist of utility-bearing attributes and that the values of those attributes collectively contribute to the price of the product (Rosen, 1974).

This approach is called the hedonic pricing method a form of revealed preference of valuation. The hedonic price analysis aims to disentangle various attributes from one another for the purpose of estimating implicit prices (Andersson, 2000). Its subjacent assumption postulates that each good is characterized by a set of traits. In other words, hedonic prices are the implicit prices of various attributes embodied in a commodity. Thus, the price of a good is a function of the amount of the attributes that it contains and of the values placed on these attributes (Carman, 1997) and can be presented as follow:

$$P_i = \alpha_i + \sum \beta_i Z_i + {}_i \quad \text{..... (1)}$$

Where;

P_i= prevailing market prices of chicken, α_i= Constant, β_i= Implicit value of Zi, Z_i= A vector of tropically adapted improved chicken's attributes, ${}_i$= Random error.

The partial derivative of P_i with respect to Z_i , $\partial P_i / \partial Z_i$ is referred to as the marginal implicit price. It represents the amount consumers are willing to pay for a change in unit of attributes such as chicken size.

In the hypothetical case in Figure 1, the hedonic price function rises from left to right implying that the larger the size of chicken the higher the price that chicken commands in the market.

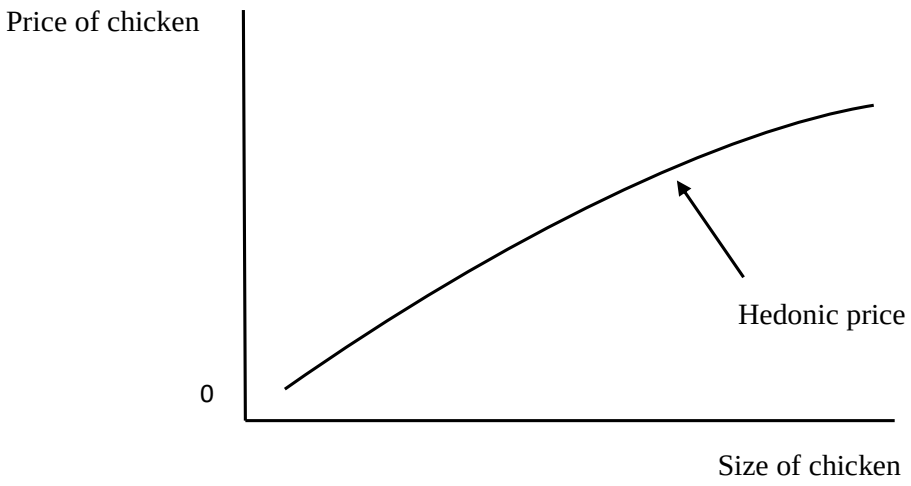

Figure 1: The Hedonic Price Schedule for characteristic or attributes of chicken.

Source: Adapted and modified from Cohen (2009)

2.2 Review of Empirical Studies

2.2.1 Measuring consumers' preferences

Consumer preferences are reflected through willingness to pay, which can be quantified through revealed preference or through stated preferences. Where market of a good do not exist stated preference method employs a survey in which a hypothetical market for the good valued is created. Hanley *et al.* (1998) reveals that, stated preference method potentially relies on respondents making choices over hypothetical scenarios. That is,

respondents are asked to choose the best alternative from among a set of hypothetical scenarios, which are completely described by a set of attributes generated from an experimental setting. Conversely, revealed preference techniques use observations on actual choice made by people at the market place to measure preference (Hensher *et al*., 2005). A potential risk with using stated preferences methods is that there could be a bias in the estimated results, if the consumers' responses in the survey do not coincide with their actual purchasing behavior. The revealed preference method of which hedonic pricing is one is able to capture consumers' actual purchases and thus is able to give a more accurate description of the willingness to pay. (Louviere *et al*., 2000).

2.2.2 Identification and ranking of product attributes that influence purchase decision

Kothari (2006) argued that when there are only two sets of rankings of objects, Spearman's coefficient of correlation is applicable, but Kendall's coefficient of concordance is considered an appropriate measure of studying the degree of association among three or more sets of rankings. Kendall's coefficient of concordance is considered an appropriate measure of studying the degree of association among three or more sets of rankings. The Kendall's establishes the extent of disagreements and agreements among responses. The Kendall's coefficient of concordance (W) is the measure of the degree of agreement among m set of n ranks. W is an index that measures the ratio of the observed variance of the sum of ranks to the maximum possible variance of sum of ranks. If the rankings are in perfect agreement, the variability among sums will be a maximum (Mattson 1986). Computing the total rank score for each constraint and objective, the constraint and objective with the least score is ranked as the most pressing whilst the one with the highest score is ranked as the least pressing. The total rank score computed is then used to calculate for the coefficient of concordance (W), to measure the degree of

agreement in the rankings (Edwards, 1964). Several researchers have used Kendall coefficient of concordance in ranking studies including;

Ndenga *et al*. (2017) used Kendall coefficient of concordance to identify and rank attributes of indigenous chicken in Kenya that are most preferred by consumers. The results of Kendall analysis indicated consumers agreed on the rankings of the attributes by 32% which was significant at 99 percent level of confidence that price, age, sex and plumage colour as most important attributes influencing consumers' choice while skin texture, tenderness and skin colour as the least attributes.

Rumatu *et al*. (2014) used Kendall coefficient of concordance to rank attributes of dressed chicken in Ghana. F – Test results from the Kendall's coefficient indicated that, there is 53.6% agreement among the rankings of the respondents which was significant at 95% level of confidence that origin of the chicken, tenderness, fat content, storage, package and taste in that order influence purchase decision.

Sodjinou *et al*. (2014) used Kendall coefficient of concordance in traders' ranking of poultry attributes in Benin. The results indicated that there is 32% agreement among traders that the birds' weight and meatiness to be the most important factor affecting the village poultry price. For chicken, the second most important characteristic is the colour of the plumage, while the sex of the bird comes in third position followed by the breed and length of the leg.

In the case of Crops, Kwakwa (2013) used Kendall coefficient of concordance to rank attributes of rice in order of importance in Ghana. The results of Kendall coefficient indicated agreement among consumers with regards to the rankings by 40% which was

significant at 99 percent level of confidence that the most important attributes of rice are more related first to taste, secondly to food safety, followed by aroma, price, color, grain size, texture with packaging been the least important attributes. Benjamin *et al.* (2011) used Kendall coefficient of concordance to identify and rank factors influencing consumer preference for quality characteristics of rice in Tamale metropolis. Concordance analysis gave a 62% agreement of preferred characteristics which are taste, cooking quality, cooking time, aroma, price, impurities and source in order of importance significant at 99 percent level of confidence.

Martey *et al*. (2014) used Kendall coefficient of concordance to rank constraints faced by small holder rice farmers in multi-stakeholder platform participation. Results were significant at 1% level that there was 21 percent agreement between the respondents in ranking of the constraints faced by smallholder rice farmers with respect to participation on the platform. Among the identified ranked constraints, distance to the meeting place, confliction of meeting days with market days, poor dissemination of information regarding meeting days and risk were the top four most constraining factors of farmers' willingness to the multi-stakeholder platform participation.

2.2.3 Influence of product attributes on price of a product

The concept underlying hedonic model is that the price of a heterogeneous good is a function of the attributes of that good (Mundua, 2010). As explained in Picard (2010) discrete models such as logit and probit among others identify importance of characteristics in commodity purchase decision but do not explain the commodity price. Random Utility Model which is also a discrete model takes the sale prices as representative of market price available to all consumers and not necessarily representative of characteristics of a product (Palmquist, 2003).

Repeat Sales Price Indexes analyze data of commodities that have been sold at least twice; they show percentage growth in sale prices over time. They however do not provide information on value of individual commodity characteristics or on price levels. The hedonic regression on the other hand reveals the expected value of a product given the characteristics and the expected contribution of each of the characteristics to that value. Several studies have applied hedonic pricing to disentangle preference attributes from bundled goods and their economic valuation.

Ramatu *et al.* (2014) determined the quality characteristics of dressed local and imported chicken using hedonic model. Results showed that premium prices were paid for imported, non fatty and tender chicken. Sodjinou *et al*. (2014) employed hedonic pricing model to understand physical traits of "bicycle poultry" in Benin. Results indicated that price of chicken was influenced by the breed of the birds, age, plumage colour and meatiness of the bird.

Bett *et al*. (2011) used hedonic price analysis to determine live indigenous chicken attributes and socio economic characteristics that influences the chicken price in Kenya. Results indicated that plumage colour, sex, body condition, age and weight and body size had significance influence on price. Hedonic price model has also been used in Korea to analyze retail prices of eggs in order to identify those attributes that affect prices and the respective value of each attribute (Chang *et al*., 2010). Results indicated that the status of eggs fertility, organic feeding and free range feeding are the main attributes that positively affect the retail price.

Hedonic price model has also been used in other livestock such as beef cattle. For example, Timothy (2006) sought to analyze cattle prices in central corridor of West

Africa by employing hedonic price model. Specifically, the study was to determine if market participants have systemic preferences for cattle attributes and their willingness to pay premium price for the attributes. The results indicated that animal age, sex, breed, body condition, purpose of purchase, season of sale and market location were the most significant factors influencing short runcattle prices in the study region.

Terfa *et al*. (2013) have employed hedonic pricing model to value traits of indigenous sheep in central Ethiopia. The empirical results indicate that phenotypic traits of traded indigenous sheep (age, color, body size, and tail condition) are major determinants of price implying the importance of trait preferences in determining the price of sheep in local markets. Season and market locations are also very important price determinants. Other factors affecting sheep prices were attributes of buyers and sellers, such as occupation and education level to serve as proxies for bargaining power. On beef products, Lee *et al*. (2012) employed hedonic model to determine the effect of product attributes on retail beef steak prices. The study established that organic production claims, religious processing claims and boneless products were major characteristics that commanded price premiums.

In crop, Mishili *et al*. (2009) conducted a study in Tanzania where they applied hedonic price model to analyze consumer preference for bean grain quality characteristics. The investigated variables included size of bean grains, grain damage by bruchids, percentage of discolored grain and percentage of mix. Results showed that consumers placed significant importance on cooking time.

Hannah (2015), employed hedonic price model to analyze the effects of common beans attributes on price in Kiambu Kenya. Results indicated that consumers were willing to

pay premium prices for taste, price and cooking time. Whilst, Dalton (2003) used hedonic price model to evaluate consumption attributes perceived important by rice consumers in West Africa. Results showed that grain elongation and swelling were important in relation to the amount of rice prepared and the amount that can effectively feed a household.

Anang *et al*. (2011) studied consumer preference for quality characteristics of rice in Accra and the effects of these preferences on price using descriptive statistics and hedonic price model. The results revealed that income and education have significant effect on consumer preference. Also, tastes absences of foreign matter, aroma and shape were the quality attributes that most consumers prefer, and were willing to pay more for these attributes.

Other applications of the method were those involving fish. For example, Nadarajah (2012) employed simple linear form of hedonic price model to evaluate the relationship between price and quality attributes of shrimp. The results indicated that market price is influenced by extrinsic quality attributes such as carapace length, weight, origin, species, freshness and product form and preservation method. The above reviewed studies show the importance of studying the food attributes particularly to determine the value of each attribute in a product as it has impact on the price of a product.

2.3 Conceptual Framework

A conceptual framework adopted for the study is presented in Figure 1. The price of chicken, which assigns an economic value to different attributes, is a function of attributes of the tropically adapted improved chicken including; size of chicken, fat content, tenderness, sex of chicken, plumage colour and taste of chicken. As depicted in

Figure 2, chicken attributes influence consumer preference, which in turn influences price of chicken. Social demographic characteristics of consumers such as education level, income level, age, household size, marital status and sex influence consumers' willingness to pay premium or discount price for the new introduced chicken. This framework has been used to address the objectives of this study.

Independent variables

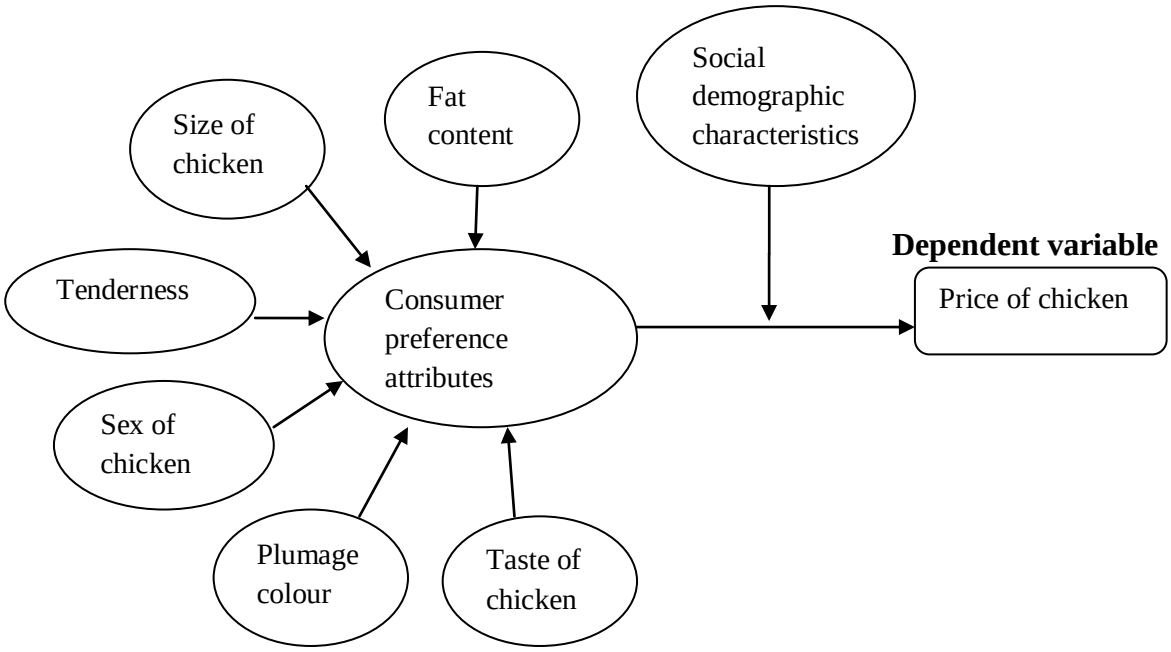

Figure 2: Conceptual framework showing influence of consumer preference attributes of tropically adapted improved chicken on price of chicken

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the study Area

The study was conducted in Morogoro and Njombe Regions in Tanzania. The regions are among the ACGG project implementation sites in which the selection was based among others on high contribution of poultry to household income and nutrition, large market share captured by smallholders, presence of farmers out of the project keeping tropically adapted improved chicken anddiversity across zones for the interest of testing strains in a number of production environment (ILRI, 2014). Morogoro region lies between latitude 5º 58'' and 10º 0'' to the south of equator and longitude 35º 25'' and 35º 30'' to the east of Greenwich. Njombe region lies between latitude 08º and 40' and 10º and 32' South of the Equator and between longitude 33º and 47' and 35º and 45' east of Greenwich.

3.2 Research Design

As stated in section 1.3.1 the overall objective of this study was to analyze consumer preference attributes for tropically adapted improved chicken in Morogoro and Njombe regions. A cross sectional research design was used to address this objective and related specific objectives, where data from consumers were collected at a single point in time without repetition from the representative population (Kothari, 2006). In case of prices the study used the prevailing market prices of the improved chicken in particular villages which satisfies the use of hedonic price model.

3.3 Sample Selection and Sample Size

Multiple stage sampling procedure was used, whereby in the first stage Morogoro and Njombe Regions together with two (2) districts from each region (Mvomero and

Morogoro in Morogoro region and Njombe rural and Wanging'ombe in Njombe region) were purposively selected (ACGG project areas). In the second stage, three (3) villages were randomly selected from each district and in the final stage consumers were randomly identified from each village. Sixty (60) consumers from each region were studied making a total of 120 consumers. The small sample was due to the fact that only few chickens were sold, thus few have had an opportunity to purchase and taste the new strains.

3.4 Source of Data

Primary and secondary data was used in this study. Primary data comprised of consumer preference attributes identification and ranking, social economic factors of consumers were collected using structured questionnaire (Appendix 1) and focus group discussions from the consumers also the study used chicken prices existing in the market. Secondary data was obtained from the ACGG implementation and progress reports and online publication on tropically adapted improved which provided meaningfully analysis.

3.5 Analytical Tools

3.5.1 Kendall coefficient of concordance

For the first specific objective, a list of key attributes of dressed and live tropically adapted improved chicken were identified by consumers in the preliminary survey and then later presented to consumers for confirmation and ranking using Kendall coefficient of concordance (W). The Kendall's Coefficient of Concordance test is a non parametric statistical procedure used to identify a given set of constraints or problems, from the most influential to the least influential as well as measure the degree of agreement or concordance among the respondents. The range of the coefficient W ranged between zero

(0) and one (1). Where W=1 all the respondents have been unanimous and W=0 no overall trend of agreement among the respondents (Dagnelie, 1998).

Attributes were ranked from the most influential to the least influential using numerals 1, 2, 3 ... n in that order (where n is a positive integer). The total mean rank score for each attribute was computed and the attribute with the least score was ranked as the most pressing attribute, while the attribute with the highest score was ranked as the least attribute. The total rank score computed was used to calculate the Kendall's Coefficient of Concordance (W), which measures the degree of agreement between respondents in the ranking. The formula for the coefficient of concordance is:

$$W = \frac{(\sum T^2 - (\sum T)^2/n)}{m^2 (n^2-1)/12} \quad \text{..... (2)}$$

Where, W = Kendall's Coefficient of Concordance, T = Sum of ranks for attributes being ranked, m = Total number of respondents (consumers) and n = Total number of attributes being ranked.

3.5.2 Hedonic price model

For the second and third objective, Hedonic price model was used whereby the hedonic regression reveals the expected value of product given the characteristics and the expected contribution of each of the characteristics to that value. The specification for hedonic model is the linear regression model and the estimation procedure is the ordinary least squares (OLS).

The basic model for hedonic pricing is;

$$P_i = \alpha_i + \sum \beta_i Z_i + {}_i \quad \text{..... (3)}$$

Where;

P_i= Average price of chicken,α_i= Constant, β_i=Implicit value of Z_i,Z_i=vector of attributes of tropically adapted improved chicken, $_i$=Random error.

The partial derivative of P_i with respect to Z_i , $\partial P_i / \partial Z_i$is referred to as the marginal implicit price. It represents the amount consumers are willing to pay for a change in unit of attributes.

Log linear model was used as is the case in the study by Stock and Watson (2015). This means that the price was computed as the natural logarithm of the price. The regression model is then;

$$LnP_i = \alpha_i + \sum \beta_i Z_i + {}_i \quad \text{..... (4)}$$

In a log linear model, a one unit change in Z_i is represented by a (β_i*100) % change in P_i (Stock and Watson, 2015).

Specification of the model into estimable form for this study;

$$\begin{aligned} \text{LnP}_i = {} & \beta_0 + \beta_1 \text{weight of chicken}_{ij} + \beta_2 \text{ sex of chicken}_{ij} + \beta_3 \text{plumage colour}_{ij} \\ & + \beta_4 \text{tenderness}_{ij} + \beta_5 \text{fat content}_{ij} + \beta_6 \text{income} \\ & + \beta_7 \text{education level} + \beta_8 \text{sex}_{ij} + \beta_9 \text{age} + \beta_{10} \text{household size} \\ & + \varepsilon_i \text{ ..... (5)} \end{aligned}$$

The detailed definitions of the variables employed in hedonic price model (5) are provided in Table 1.

Table 1: Explanatory variables and the priori expectations

Variable	Description	Prior expectation
Weight of chicken		
1-3kgs	Reference	-
Above 3kgs	1=above 3kgs, 0=otherwise	+
Sex of chicken		
Male	1=male, 0=otherwise	+
Female	Reference	-
Plumage colour		
Mixed colour	1=mixed colour, 0=otherwise	+
Brown colour	1=brown colour, 0=otherwise	+
Black colour	Reference	-
Tenderness		
Tender	1=tender, 0=otherwise	+
Hard/tough	Reference	-
Fat content		
Low fat content	1=low fat oil, 0=otherwise	+
High fat content	Reference	-
Social demographic factors		
Sex of consumer	1=male, 0=otherwise	+/-
Age in years	Continuous	+/-
Education (years of schooling)	Continuous	+
Household size	Continuous	-
Marital status	1=married, 0=otherwise	+

3.5.3 Priori expectation

Negative sign for chickens weighing less than 1kg was expected because consumers primarily are after meat when buying the chicken. As a result, we expect that consumers prefer heavy chicken to lighter chicken. Therefore heavy chicken will tend to have higher

prices than lighter chicken hence positive sign for chickens above 3 kg. According to Tougan *et al*. (2013) and Sunday *et al*. (2010), the sex of the bird influences the quality of poultry meat. Indeed, these authors stated that males are less fatty (at equivalent age) than females. Put differently, they note that the lipid content of chicken meat seems to be higher in females than males, but crude protein content is higher in males than females. It follows that consumers who are averse to fat will have a preference for males therefore, we assume that the males will receive premium prices hence a positive sign for male chicken.

Various studies (Aklilu, 2007; Vidogbena *et al.*, 2010) have highlighted the influence of the plumage colour on consumers' choice of the type of poultry. During the exploratory survey, white, black and mixed colours were highlighted as affecting consumer preference and in turn the price of the bird. The study hypothesized that brown colour and mixed colour chicken will have a positive effect on the price of poultry, unlike the black colour will have a negative effect on price because of witchcraft perception and non appealing appearance.

Negative sign for hard or tougher chicken which is usually observed in older chicken and through chickens with rough skin is because tougher chickens tend to take long hours to prepare therefore more preference for tender chicken (Ndenga *et al*. (2017). Positive sign for low fat chickens is expected because preference for low fat chickens can be attributed to health complications associated with consuming meat with high fat content despite the fact that fatty chicken need no or less cooking oil.

Socio-economic variables of consumers were predicted to influence willingness to pay for the chicken in different directions. For gender and marital status of the respondent an

effect is sometimes found, although a priori there is no expectation on the direction of the effect. The other socio-economic variables indicated respondent's ability or inability to pay. Household monthly income and educational attainment were expected to impose positive effects on willingness to pay hence indicate a higher ability to pay (Akankwasa, 2007; Owusu, 2009). For household size variable, it was expected that the more number of members in the respondents household, the less willing he or she would pay for the chicken due to more expenses for the household. On the other hand, age could have both positive and negative effects depending on how they value the chicken.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Social Economic Characteristics of Consumers

About 54% out of sampled consumers were females in both regions (Table 2), this is true because family home based activities including food preparation, consumption decision, taking care of children and attending to the market are mostly carried out by women in African families (Kirigia *et al.*, 2013).

The mean ages of consumers were 36 and 40 years in Morogoro and Njombe regions respectively. The age category is energetic; therefore tend to be active in decision making pertaining to consumption and purchase of food products. These findings agree with the study done by Adinya *et al*. (2008) which found that people in age groups of 31 - 60 are more economically active and independent than those in the age group of less than 31 years and above 60 years.

Literacy rate was slightly higher in Morogoro region (95%) than in Njombe region (87%) as evidenced in Table 2. Both rates seemed to be higher compared to the national average literacy rate which was reported at 78% in 2015 (World Bank, 2016). According to FAO (2010), education attainment has positive influence on quality food choices. Therefore, its fair assumption that consumers with higher level of education have higher understanding regarding the value of the attributes of the improved chicken.

The average family size was higher in Njombe region than in Morogoro region. Njombe region had 3 extra family members with a maximum of 14 family members compared to 9 family members in Morogoro region (Table 3). Stewart *et al*. (2004) argued, household

size with large number of dependants could partly influence food choices, which impacts negative influence on the price of chicken because the more the number of members in the respondents household, the less the willingness to pay for the chicken due to little budget allocated to high protein food such as beef and chicken.

Table 2: Socio economic characteristics of the sampled consumers

	Morogoro n=60		Njombe n=60		Total n=120	
Variables	**Freq uency**	**Perce ntage**	**Freq uency**	**Perce ntage**	**Freq uency**	**Perce ntage**
Gender						
Male	26	43.3	29	48.3	55	45.8
Female	34	56.7	31	51.7	65	54.2
Total	60	100	60	100	120	100
Marital status						
Married	45	75	36	60	81	67.5
Single	4	6.7	3	5	7	5.83
Divorced	6	10	5	8.3	14.3	11.9
Widowed	5	8.3	16	26.7	21	17.5
Total	60	100	60	100	120	100
Education level						
Primary	17	28.3	25	41.7	42	35
Secondary	24	40	17	28.3	41	34.2
Informal	7	11.7	6	10	13	10.8
College	9	15	4	6.7	13	10.8
None	3	5	8	13.3	11	9.2
Total	60	100	60	100	120	100
Variable	**Region**	**N**	**Min**	**Max**	**Mean**	**Std**
Household size	Morogoro	60	2	9	5	1.652
Household size	Njombe	60	3	14	8	1.408
Age of consumer	Morogoro	60	20	60	36	9.829
Age of consumer	Njombe	60	19	71	40	13.511
Income (month)	Morogoro	60	300000	700000	472500	128691
Income (month)	Njombe	60	200000	600000	339166	95709

Among the sampled respondents in Morogoro region, 75% were married and the rest 15% were not married while in Njombe region 60% were married whereas the rest 40% were not married. The mean monthly income of consumers from Morogoro (472 500 Tzs) was higher than that of consumers from Njombe (339 166 Tzs), the difference being explained by geographical and economic differences. The willingness to pay is positively linked to the income level as a higher income means that more money can be spent on a certain product (Loke *et al.,* 2015).

4.2 Form of Preference of Purchasing tropically Adapted Improved Chicken

Majority of consumers (70%) and (81%) in Morogoro and Njombe region respectively, preferred to purchase the improved chickens in form of live chicken rather than in any other forms (Table 3). This is due to the fact that consumers are able to assess the desired attributes of chicken such as health, colour and weight before making purchase. Islam (2003) reported that, consumers preferred to buy live indigenous poultry because of lack of trust regarding the slaughtering method and fear of disease or sick birds slaughtered. Purchasing dressed chicken is uncommon in most study areas except in super markets, in addition to that, consumers reported that purchasing dressed chicken prevents them from getting some parts of chicken including legs, heads and intestines. Few consumers for dressed chicken (18.3%) and (16.7%) in Morogoro and Njombe region respectively, represents consumers looking for convenience as a means to save time for slaughtering and preparation especially for non family consumers. Since most of the study areas were based in rural setting, less than 15% in both regions preferred to purchase cooked chicken, the low proportion is due to a tendency whereby food is normally prepared and eaten at homes also cooked chicken are sold at a higher price than other forms.

Table 3: Form of preference of purchasing the chicken

Variable	Morogoro		Njombe		Total sample	
	Frequency	%	Frequency	%	Frequency	%
Dressed	11	18.3	10	16.7	21	17.5
Live	42	70.0	49	81.1	91	75.8
Cooked	7	11.7	1	1.7	8	6.7
Total	60	100	60	100	120	100

4.3 Consumers' Preference Attributes for tropically Adapted Improved Chickens

Information on consumer preference attributes for the studied chicken is presented in Table 4. The identified key attributes of improved chicken that influence purchase decision and consumption include: weight of chicken, price of chicken, sex of chicken, plumage colour, tenderness, fatness and taste.

With regards to weight of chicken, consumers reported that, tropically adapted improved chicken possess large body size and are heavier than local chickens. This attribute was mentioned by 71.6% and 65% of the consumers in Morogoro and Njombe respectively. The advantage of size in this respect is that meat from one chicken can provide enough portions for a modest family for one meal or more. For this group the preference was for those birds weighing more than 3 kg live weight. These results are in line with Ndenga *et al*. (2017) who mentioned size as the most important attribute influencing consumers' choice and consumption of local chicken in Kenya. Some consumers also preferred rather smaller carcass with weight averaging 1-3 kg (28.4% and 35% in Morogoro and Njombe respectively), the lighter birds were observed to have less fat.

Price of chicken was also mentioned as an important attribute that influence purchase decision. This was mainly determined by income level of the consumer despite of other desired attributes. Sex of a chicken in tropically adapted improved chicken influence

purchasing decision and consumption as evidenced by more preference for male chicken than female chicken represented by 58.3% and 68.3% of consumers in Morogoro and Njombe respectively. Males were said to have moderately lower fat coupled with large body size at an early age. Since males are often slaughtered earlier, their meat tends to be tender compare to hens which are often slaughtered post lay (Ndenga *et al*., 2017).

Regarding plumage colour, more than half of consumers out of sampled respondents in both regions preferred mixed colour plumage chicken mainly because of aesthetic reason, followed by brown colour plumage (35% and 41% of consumers in Morogoro and Njombe respectively). There was less preference for black chickens because were associated with local traditional believes that black chickens are used for witchcraft. A study done by Bet *et al*. (2011) in Kenya on local chicken discovered that consumers had low preference for black chickens because they were mostly used in witchcraft.

Meat from improved strains was said to be tenderer compared to that from local chicken as expressed by majority of the respondents (70% and 78.3% in Morogoro and Njombe respectively). Consumers assessed tenderness of the chicken meat by considering the age of the chicken and through observing the skin of the chicken. Younger chicken were tenderer than older chickens. Tenderness was also linked to ease of preparation and chewing (Sodjinou *et al.,* 2014). In contrast to that consumers prefer the tough meat that characterizes indigenous poultry, because most meat is used in soups, while the meat from modern breeds is too tender to hold up under long cooking times (Schneider *et al.,* 2010).

Table 4: Consumers' preference attributes for tropically adapted improved chicken

Regions		Morogoro		Njombe		Total	
Attributes	Categ ories	Freq uency	Perce ntage	Freq uency	Perce ntage	Freq uency	Perce ntage
Size of chicken	Above 3kgs	43	71.6	39	65	82	68.3
	1-3kgs	17	28.4	21	35	38	31.7
Total		**60**	**100**	**60**	**100**	**120**	**100**
Sex of chicken	Male	35	58.3	41	68.3	76	63.3
	Female	25	41.7	19	31.7	44	36.7
Total		**60**	**100**	**60**	**100**	**120**	**100**
Plumage colour	Mixed col.	37	61.6	31	51.6	68	56.6
	Brown col.	21	35	25	41.6	46	38.3
	Black colour	2	3.4	4	6.8	6	6.1
Total		**60**	**100**	**60**	**100**	**120**	**100**
Tenderness	Tender	42	70	47	78.3	89	74.2
	Hard/tough	18	30	13	21.7	31	25.8
Total		**60**	**100**	**60**	**100**	**120**	**100**
Fat content	Low fat	49	81.6	23	38.3	72	60
	High fat	11	18.4	37	61.7	48	40
Total		**60**	**100**	**60**	**100**	**120**	**100**

With regards to fat content consumers claimed that the chicken especially weighing above 3 kg possessed high content of abdominal fat. Extra fat was trimmed and used for cooking other foods which is an added advantage. However, the preference for fat chicken was more skewed in favour of Njombe (61.7%) while the proportion was only 18.4% for Morogoro. Sodjinou *et al*. (2014) reported that consumers' preferred local chicken because they possess less fat compared to modern breeds. The general conclusion was that the introduced strains had acceptable qualities including taste.

4.4 Kendall Ranking of the tropically Adapted Improved Chicken Attributes

Results of Kendall ranking (Table 5) in Morogoro region indicated that weight of chicken, price of chicken, sex of chicken and taste of chicken were the most important

attributes influencing purchasing and consumption decision. Fat content, plumage colour of chicken and tenderness were the least ranked attributes influencing purchase and consumption decision. In Njombe region, price of chicken, weight of chicken, sex of chicken and fat content were ranked as the most important attributes influencing purchase and consumption decision. Taste, plumage colour of chicken and tenderness were the least ranked attributes influencing purchase and consumption decision. In Morogoro region consumers were more sensitive to weight of chicken than the price of chicken which is contrary to consumers from Njombe region who considered price first before the size of the chicken. Probably because in Morogoro region sampled consumers had higher average income levels than sampled consumers in Njombe region as evidenced in Table 2. In Njombe region consumers ranked fat content as among their most important attribute because Njombe is a cold temperature region therefore more preference for foods rich in fat.

In comparison to other studies on local chicken; Queenan *et al.* (2016) reported that when purchasing local chicken consumers concentrated on size, estimated weight and overall health in Tanzania. Markos *et al.* (2014) mentioned Plumage colour, body weight, comb type and shank colour as the most important attributes of village chicken in Ethiopia. Sizes of chicken, price of chicken and plumage colour were the most important attributes influencing purchase and consumption of local chicken in Kenya (Ndenga *et al.,* 2017). Issa *et al*. (2015) established that taste and price were the main determinants of indigenous chicken consumption in ND'jamena.

The Kendall coefficient of concordance (W) in Table 6 indicated that 67% of consumers were in agreement ($P<0.05$) on ranking of the tropically adapted improved chicken attributes.

Table 5: Kendall ranking of the tropically adapted improved chicken attributes

Attributes of chicken	Morogoro (N=60)		Njombe (N=60)		Total (N=120)	
	Mean rank	rank	Mean rank	rank	Mean rank	rank
Size /weight of chicken	2.02	1	2.39	2	1.75	1
Price of chicken	2.18	2	1.49	1	2.28	2
Sex of chicken	3.13	3	2.93	3	3.27	3
Plumage colour	5.73	6	5.93	6	6.19	6
Tenderness	6.47	7	6.65	7	6.20	7
Fat content	4.87	5	4.20	4	3.67	4
Taste of chicken	3.61	4	4.40	5	4.63	5

Thus, weight of chicken, price of chicken, sex of chicken and fat content were the most important attributes in that order influencing purchasing and consumption decision of improved chicken while taste of chicken, plumage colour of chicken and tenderness were regarded as least important attributes influencing purchasing and consumption decision. In contrast, Ndenga *et al.* (2017) discovered size, price, age, sex and plumage colour as important attributes for local chickens in Kenya which scored 32% W, which was much lower than value obtained in the current study.

Table 6: Kendall's Coefficient of Concordance

Test	Statistics
N	120
Kendall’s	0.667
Chi square	480.578
Df	6
Asymp. Sig.	0.000

4.5 Influence of tropically Adapted Improved Chicken Attributes and social Economic Characteristics on the Price of Chicken

The results in Table 7, show F- statistic (F = 15.772) and (F = 9.470) being statistically significant at one percent in Morogoro and Njombe regions respectively, indicating that

the independent variables as a set, significantly affect the dependent variable (price of chicken). The R-square indicates that 46% and 42% of the variability in prices is explained by the independent variables in Morogoro and Njombe regions respectively. The attributes were interpreted with respect to the default dummies (Gujaratti, 1995).

Table 7: Estimation of Hedonic price model

	Morogoro		**Njombe**	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Contant	9.3682***	0.0682	7.0342***	0.0491
Size weight				
1-3kgs (reference)				
Above 3kgs	0.1252**	0.1081	0.1052**	0.0608
Sex of chicken				
Female (reference)				
Male	0.1012***	0.0294	0.0651*	0.0212
Plumage colour				
Black colour (reference)				
Mixed colour	0.0453	0.0274	0.0391**	0.0174
Brown colour	0.0156	0.0467	-0.0311	0.0576
Tenderness				
Hard/tough (reference)				
Tender	0.1844***	0.0617	0.1291**	0.0415
Fat oil content				
High fat content (reference)				
Low fat oil	0.0192*	0.0467	0.049**	0.0184
Social economic factors				
Gender (male)	0.1252	0.1091	0.1201	0.1329
Age in years	0.0485	0.0501	0.0197	0.0216
Education in years	-0.1185	0.0883	-0.0238	0.0154
Monthly income	0.2076**	0.0146	0.1725*	0.0663
Household size	-0.0082	0.0113	-0.0185**	0.0104
Marital status (married)	-0.0184	0.0226	-0.0357**	0.0168

Note: ***, **, * indicates significant at 1%, 5% and 10% respectively

With regards to weight of chicken, large size birds weighing above 3kgs had significant and positive influence (P<0.01) on the price of chicken compared to birds weighing below 3 kgs (reference group) in both regions. Price of large size birds above 3kgs tends to be 12% and 10% higher than that of weight below 3kgs in Morogoro and Njombe respectively. The study found that weight of chicken was the first most important attribute influencing the purchase and consumption of improved chicken referred in section 4.3, the implication is there is high demand for the large size birds which commands a rise in price. Queenan *et al*. (2016) mentioned weight of chicken as an important attribute that influence the purchase of local chicken in Tanzania. Since the improved chicken have large body size compared to local chicken whereby one chicken can weigh up to 6 kilograms at maturity if well fed (Dessie, 2017). The chicken will meet the demand and preference of consumers.

Male chickens had significant and positive influence (P<0.001) and (P<0.10) on the price of chicken compared to female counter parts in Morogoro and Njombe respectively. Male chicken received premium prices 10% and 6% higher compared to female chicken in Morogoro and Njombe respectively. Males were said to have moderate lower fat coupled with large body size at an early age. Since males are often slaughtered earlier, their meat tends to be tender compare to hen which are often slaughtered post lay (Ndenga *et al*., 2017). The results corroborates with findings of Bett *et al*. (2011) who reported that male chicken had positive influence on price of indigenous chicken significantly.

In Njombe region, mixed colour plumage chicken had significant and positive influence (P<0.01) on the price of chicken compared to black colour chicken. The price of mixed colour chicken tends to be 3% higher than that of black colour chicken. Preference for mixed colour chicken was attributed by aesthetic reason. Mixed colour plumage had

positive influence (P>0.1) on price of chicken as expected in Morogoro region but the results were insignificant. Probably consumers were indifferent to colours when purchasing the chicken. The results are somehow similar to a study conducted by Sodijnou *et al*. (2014) who found that in local chickens buyers paid premium prices for white and red colours while discounted chickens with black plumage colour.

In both regions, tender chicken had significant and positive influence (P<0.001) and (P<0.01), on price of chicken compared to hard or tough chicken. Price of tender chicken tends to be 18% and 12% higher than that of hard or tough chickens. Ramatu *et al.* (2014) found that premium prices were paid for non fatty and tender chicken. Tenderness was also linked to ease of preparation and chewing (Sodjinou *et al.,* 2014).

In Morogoro region, low fat content had significant and positive influence (P<0.10) on price of chicken implying that low fat chicken received 9% higher price compared to high fat chicken. Preference for low fat chickens can be attributed to health problems related to consuming meat with high fat content (Ndenga *et al.,* 2017) while in Njombe region consumers discounted low fat content chicken, because with high fatty chicken no need of purchasing cooking oil for roasting but the results were insignificant probably because consumers did not incorporate fat content into buying decision or are ignorant in differentiating between low and high fat content chicken.

The study further sought to establish the influence of social economic characteristics of consumers on the price of improved chicken. Monthly income, household size and marital status provided significant results as explained below;

Monthly income level had positive significant influence (P<0.01) and (P<0.10) on the price of improved chicken. Consumers with higher level of income paid 20% and 17%

higher prices compared to consumers with lower income in Morogoro and Njombe respectively. The higher the income level, the higher the willingness to pay for the chicken.

In Njombe region household size had negative significant influence ($P<0.01$) on price of chicken. Households with bigger family members paid discount prices for the chicken than those who had less family members. Prices between the two households differed by approximately 1%. Because big households size are accompanied with burden of family expenditures compared to small household size therefore less budget is allocated for chicken. The findings contradicts with those of Moni (2014) who reported that household size positively and significantly influenced the consumption of chicken, beef and pork in central Kenya.

In Njombe region Married consumers had negative significant influence ($P<0.01$) on the price of chicken. Married consumers paid 3% lower price for the chicken compared to unmarried consumers contrary to the expected sign in Table 1. The findings corroborates with those of other studies. Kostakis (2013) found that income, age, gender, marital status and place of residence had an impact on household food expenditures.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The objective of this study was to establish consumers' preference attributes for tropically adapted improved chicken in Morogoro and Njombe region. Results of Kendall coefficient indicated that consumers were in agreement on ranking by 67% on attributes of improved chicken which influence purchasing and consumption decision. The attributes were weight of chicken, price of chicken, sex of chicken, fat content, tenderness, plumage colour and taste of chicken consecutively. However, there were minor differences in ranking of the traits between regions.

Results of hedonic price model in Morogoro region indicated that large sized chicken, male chicken, tender and low fat chicken significantly received premium price while in Njombe region, large sized chicken, male chicken, mixed colour chicken and tender chicken significantly received premium prices. Furthermore, social economic characteristics of consumers such as monthly income, household size and marital status significantly influenced the price of chicken.

Thus, consumers' preference for the attributes of tropically adapted improved chicken implies market acceptance of the chicken breed. In addition to that, the low ability of the local chickens in fulfilling the demand of consumers for desired attributes such as large size birds tender chicken and fatty chicken will be met by the improved chicken since the improved chicken have higher growth rate, higher fatty content and are more tender compared to local chickens. Therefore, the problem of shortage of local chickens due to high consumer preference for local traits over the other chickens will be solved by the

improved chickens. The study concludes that improved chickens have potential for up-scaling given their perceived attributes.

5.2 Recommendations

Farmers in the study regions and beyond should strategize their production practices by adopting keeping of the improved strains by enhancing preferred attributes so as to benefit from high revenue realized from premium prices for these attributes. The strains however are large in size, the demand for more inputs and better management through quality feeds and sound production systems is necessary. Excess males should be prioritized for live chicken market as they command better price while large proportion of females should be retained for laying purposes.

Farmers should also avoid keeping chickens beyond maturity periods since meats from older chickens are hard or tough as tender meats received premium prices. In addition to that, Farmers and traders should prioritize black plumage chickens for dressed chicken market since consumers are not able to detect colours in dressed chickens, In the case of live chicken market farmers should prioritize mixed colour plumage as they attract the attention of consumers compared to other colours.

Breeding programs should be promoted through government and private sector support to focus and incorporate final consumer preference attributes in their research work to enhance acceptability of the final product. In addition to that, government, private sector and mass media should promote awareness to the public on the availability of the tropically adapted improved chicken with superior attributes over the local chicken which will attract employment opportunities across the value chain to support poverty

reduction, productivity growth, increased household animal protein intake and the empowerment of women farmers in rural communities.

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APPENDICES

Appendix 1: Questionnaire for consumers of tropically adapted improved chicken

Name of the interviewer…… Date of interview……

Name of the respondent……. Region…….....

Questionnaire Number…….....District…… Village/ward.....

Section A: Personal and Household Characteristics

PART A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1.0 Personal information

1.1. Sex of respondent □ Male □ Female

1.2. Marital status □ Married □ Single □ Divorced □ Widowed

□ Other (specify)……..

1.3. Age…….. (Years)

1.4. House hold size ……. (Number of people)

1.5. Number of HH members below 18 years.....

1.6. Educational level of respondent □ No formal education □ Primary education

□ Secondary education □ Graduate □ others (specify)…….

2.0 Occupation and income

Occupation	Income per month
Major	
Minor if any	
Total Income per month (Tzs)	

PART B: TROPICALLY ADAPTED IMPROVED CHICKEN PURCHASING AND CONSUMPTION

3.0 Consumption behaviour

3.1 Have you ever eaten tropically adapted improved chicken? □ Yes □ No (If yes continue with 3.3, if No, ask 3.2 only and skip to another consumer)

3.2What is the reason for not have eaten tropically adapted improved chicken.....

3.3 What is your frequency of eating tropically adapted improved chicken in a month?.....

3.4. Which chicken strain among tropically adapted improved chicken have you eaten and their frequency?

□ Kuroiler

□ Sasso

□ Black austrolop

Please provide reason for your selections.....

3.5 Where do you normally eat tropically adapted improved chicken meat?

□ Home

□ Food vender

□ Restaurant

□ Hotel

□ Other (Specify).....

3.6 How much (in Tzs) do you spend on tropically adapted improved chicken each month? …….

3.7 In which form do you prefer to buy tropically adapted improved chicken?

□ dressed

□ Live

□ Roasted

□ Others (specify)……

Please provide reason for your selection.....

3.8 Please check the most **important** attributes of tropically adapted improved chicken of those listed below or not listed that you consider most important when you purchase tropically adapted improved chicken and provide reason for your selection. (**This was done in advance in the preliminary survey**)

Price □ Size/weight □ Age of chicken □

Tenderness □ Taste □ Skin texture □

Fat oil content □ Plumage colour □ Skin colour □

Sex of chicken □ Meat colour □other specify.....

3.9 Please rate the selected attributes from the most influential to the least influential using numerals 1, 2, 3 ... n in that order (where n is a positive integer)

	Chicken attributes (live and dressed)	**Please rate the attributes in order of priority**	**Reason for ranking**
1	Size and weight		
2	Taste		
3	Price of chicken		
4	Tenderness		
5	Fat oil content		
6	Plumage colour		
7	Sex of chicken		

4.0 Key 7 attributes were identified by consumers and presented below for confirmation based on their preference together with providing reasons for their selection

- Size/weight □ Above 3kgs, reason.....
  □ Below 3kgs, reason.....
- Taste □ Delicious, reason.....

□ Not delicious, reason.....

- Tenderness □ Tender, reason.....
  □ Hard/tough, reason.....
- Fat oil content □ Low fat content, reason.....
  □ High fat content, reason.....
- Plumage colour □ Mixed colour, reason.....
  □ Brown colour, reason.....
  □ Black colour.....
- Sex of chicken □ Male, reason.....
  □ Female, reason.....

4.1 What are attributes that are present in the improved chicken but are not available in other chicken particularly local chickens....., ..., ...

4.2 At what price do you usually purchase a matured improved chicken or what is the price of a matured improved chicken in your particular village?.....

4.3 What are the reasons for variation of prices if variation exist, in your particular village?.....

Thanks

Appendix 2: About the ACGG Program

African Chicken Genetic Gains is an **Africa-wide collaboration** led by the **International Livestock Research Institute (ILRI)**. In November 2014, ILRI and partners initiated this new collaboration to provide better chickens to smallholder farmers in Africa. Part of the wider '**Live Gene**' initiative, ACGG tests and makes available high-producing, farmer-preferred genotypes that increase smallholder chicken productivity in Africa. The program will improve chicken genetics and the delivery of adapted chickens to support poverty reduction, productivity growth, increased household animal protein intake and the empowerment of women farmers in rural communities.

Beyond the target countries – Ethiopia, Nigeria, Tanzania – the germplasm, data, and knowledge generated have the potential to impact millions of poor rural and peri-urban households in other countries with large backyard chicken production. In Africa, chicken production is integral in nearly all poor rural smallholder households. Family chickens produce meat and eggs for home consumption and they are a source of income. Many past efforts to make smallholder chicken production more productive in sub-Saharan Africa have failed to deliver impact because they tried to use high-producing genotypes created for intensive temperate feeding systems.

These exotic birds are often not suited to local conditions and demanded high investments in feeds, veterinary support and energy, while local breeds were overlooked. The difference today is that we can combine new genetics, improved local breeds, and enhanced delivery systems to produce high-producing but low-feed-input birds, pre vaccinated and suited to local conditions.

This program will catalyze public-private partnerships to increase smallholder chicken production and productivity growth as pathways out of poverty in sub-Saharan Africa. The immediate goal is to increase the access of poor smallholder farmers in sub-Saharan Africa to high-producing but agro-ecologically appropriate chickens. We will test improved breeds of chickens from India and Africa to demonstrate high-production potential under low-input systems. We will develop public-private partnerships to make available farmer-preferred genotypes. On-farm testing will be combined with community-level farmer innovation platforms that engage women to co-create solutions and decide what genotypes and service delivery models work best for them. African Chicken Genetic Gains aims to leverage existing research while implementing innovative approaches to the development and supply of genetics in country value chains. The program approach is characterized by five principles that guide the delivery of results and outcomes.

The program has the following objectives and deliverables:

Objective 1: Conduct a baseline survey to define and characterize current smallholder chicken production systems, chicken ecotypes, current realized productivity, husbandry practices, and the socio-economic status of poor smallholder farmers in Nigeria, Tanzania, and Ethiopia.

Objective 2: Identify highly productive local African chicken germplasm from the various countries for characterization, multiplication into stable flocks, and testing on-station and on-farm.

Objective 3: Negotiate access to foreign tropically-adapted chicken germplasm (from India and elsewhere), characterize and test them under on-station and on-farm conditions under low-input production to determine productivity in different agro-ecologies.

Objective 4: Use the information obtained from the survey and the on-station and on-farm testing to define the chicken breeds, phenotypes, and genotypes *preferred*-preferences by smallholder farmers in terms of bird color, body conformation and temperament, egg and meat productivity, Overall tropical adaptability under low-input production systems, and carcass and meat quality.

Objective 5: Develop stable multiplication lines (great grandparents, grandparents, and parent stock) of the farmer-preferred germplasm, and develop IP models to facilitate access to the germplasm by a number of private and public sector multipliers to get the improved chicks into smallholder farmers' hands.

Objective 6: Collect data and samples to evaluate and document the impact of the introduction of the imported germplasm on the diversity of indigenous chicken populations and provide strategic recommendations to inform the global efforts for conservation of indigenous germplasm resources.

Objective 7: Develop and nurture National Innovation Platforms to facilitate private sector access to the germplasm, develop business models for mass-multiplication, brooding, vaccination, and delivery to farmers, and develop value chain input delivery systems.

Objective 8: Develop and nurture community and sub-national Innovation Platforms focused on empowering poor smallholder farmers, especially women, to access preferred chicken germplasm and optimize the productivity of the birds under low-input production environments.

Objective 9: Develop a roadmap for using the data and samples collected from the on-station and on-farm germplasm testing to set up longer-term crossbreeding and chicken genetic gains programs in each country, including application of omics-based strategies for accelerating the rate of genetic gains under low-input tropical conditions and the development of synthetic crossbred chicken.