PERCEPTION OF COMMUNITY ON IMPROVED CHICKEN STRAINS AND IMPLICATIONS ON CONSERVATION OF LOCAL CHICKENS

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A DISSERTATION SUBMITTED IN A PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN TROPICAL ANIMAL PRODUCTION OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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EXTENDED ABSTRACT

The perception of farmers towards any innovation can be influenced by many factors including level of education, location, livelihood activity, gender, and age. This study was conducted in Morogoro and Singida regions, Tanzania where improved chickens were introduced by the African Chicken Genetic Gain (ACGG) project. In this study, four villages from Ifaraka town, Morogoro region (Kibaoni, Kikwawila, Lipangalala and Lumemo villages) and four villages from Iramba district, Singida region (Mampanta, Kinambeu, Idodyandole and Heka villages) were purposely selected as beneficiaries of ACGG project. In these villages, two strains of tropically improved strains (Sasso and Kuroiler) were issued for testing performance under a moderate input farmer-managed production system.

A total of 120 respondents were purposely selected for interviews based on their engagement in the chicken value chain either as a primary producer, consumer, or traders. The study involved 20 ACGG households, 20 none-ACGG households, 12 Consumers and 8 chicken traders from each region. For intervened households, each farmer was given 25 pre-brooded and vaccinated birds of either Sasso or Kuroiler. The survey questionnaire was pretested and necessary adjustments made before conducting the survey. For these reasons, the study was carried out in the two regions of Tanzania to obtain the extent to which the improved chicken strains will be preferred and to explain the implications to the local chicken conservation. The study involved collecting data through field survey and Focus Group Discussions (FGD), with each participants ranging from 5 to 10 individuals. The information collected through a single visit formal survey to obtain the perception of communities on improved versus local chicken strains concerning productivity, adaptability, and local chicken biodiversity maintenance, breeding objectives and trait

preferences of the chicken keepers. In the case of the breeding objectives and trait preferences of the chicken keepers, a Non-parametric test was used to generate descriptive statistics, while, content analysis was used for information gathered during FGDs. The generated mean ranks were assessed using Kendall's Coefficient of concordance (W) to test for the agreement of the ranking between the respondents on the data obtained. The descriptive statistics including frequencies, means, and standard deviations were used to explain the perception of the respondents. Besides, a multiple regression analysis was performed to find out the relationship between dependent and independent variables explaining the perception of communities. Furthermore, a Likert scale was used to gauge the perception of respondents.

The results indicated that both local and improved chickens were mainly kept for revenue (1.28) and home consumption (1.84) from both regions. There was little variability in a ranking of the trait preferences by the chicken producers from individual respondents as well as from focus group discussions. Local chickens were preferred due to their higher adaptability (2.00) and brooding behavior (2.13), while egg production (1.45) and meat yields (1.80) were the major traits preferred for the households rearing improved chicken in both regions. The findings underscored breeding objectives and trait preferences as crucial for the development of holistic and sustainable genetic improvement of local and improved chickens in rural areas. The average number of flock sizes were found to be 13.46±11.255 and 20.84±11.245 chicken per household for the improved and local chicken strains respectively. During FGDs respondents reported that the management cost of improved chicken strains was higher than that of the local strains although the former had better performance hence farmers, were ready to increase the flock. More than 50% of the respondents reported that the adaptability of local strain was better than that of the improved strains. More than 80% of the respondents reported that productivity in

terms of eggs and meat yield of improved chicken strains is higher than that of local chicken strains. More than 60% of the respondents did not see if the introduction of improved chicken strains will lead to the erosion of local chicken strains. Measured at breed level, the desire to increase the number of improved chickens was significant at ($p<0.05$). Hence, most of the respondents (56.8%) and during FGDs wanted to increase the number of improved chicken because of the better performance and high prices offered at the markets.

Generally, this study concluded that adaptation and reproductive traits seem to be the most important attributes of local chicken, while the production traits, including the number of eggs and meat yield, are considered to be more relevant for those keeping improved chicken strains. For sustainability and economic empowerment of rural farmers, breeding objectives should take into account the breeding goals and preferences of farmers, traders, and consumers. Also, farmers need to change to make improvements from the traditional poultry-keeping system through the adoption of improved systems and or acquiring new highly productive and adaptive strains for farmers to realize profits. Respondents were not worried about endangering the local chicken biodiversity if the improved chicken strains will be highly distributed. Some respondents underscored that local chickens will still be kept by most of the farmers due to their important characteristics including brooding behavior, tolerance to diseases and stress hence, an opportunity for up-scaling.

DECLARATION

I, KINTINGU, TABITHA BETHUEL do hereby declare to the Senate of the Sokoine University of Agriculture that this dissertation is my original work done within the period of registration and that it has neither been submitted nor being concurrently submitted for a degree award in any other institution.

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DEDICATION

This dissertation is dedicated to my beloved husband and sons who were at my side to add courage.

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PAPER II: Kintingu, T.B, Mbaga, S.H. and Kadigi, R.M.J. (2018). Breeding objectives and producers' chicken trait preferences in Morogoro and Singida regions, Tanzania.

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LIST OF ABBREVIATIONS AND SYMBOLS

ACGG	African Chicken Genetic Gain
AnGR	Animal Genetic Resource
APMI	African Poultry Multiplication Initiative
FAO	Food and Agriculture Organization of the United Nations
FGDs	Focus Group Discussions
MLDF	Ministry of Livestock and Fisheries Development
MSc	Master of Science
N	Number of observations
NGO's	Non Governmental Organizations
s.d.	Standard Deviation
SPSS	Statistical Package for Social Sciences
W	Kendall's Coefficient of concordance

CHAPTER ONE

1.0 INTRODUCTION

1.1 Poultry Industry in Tanzania and other African Countries

Keeping livestock especially poultry is a promising sector to minimize poverty in Tanzania. The local chicken in Tanzania is approximated to be over 70% of the total chicken population and contributes significantly to human life because it ensures food security especially for poor households (MLDF, 2012). As the population increases the demand for meat from local chicken also increases (Mikulski *et al*., 2011). Chicken meat is the best meat that is consumed without any restriction from cultural or religious taboos as compared to other meat such as pork meat (Tadelle, 2003).

Over time the government and other private entities have been supporting the importation of exotic chicken such as broilers, layers and other improved breeds to meet the demand for eggs and meat in Tanzania. Some schemes such as cockerel exchange programs were initiated and promoted to improve local chicken genetics (ACGG, 2016). However, there were lacks of follow-up to maintain the hybrid vigor obtained from crossbreeding schemes. Kadigi (2013) noted that the goal of agricultural research is the development of technologies, however, as the technologies and the production system changes new constraints may arise and becomes limiting. Crossbreeding of chickens has also been used to take advantage of large body size and a higher number of eggs produced by exotic chickens. However, to realize improved productivity, farmers should also make efforts to improve the levels of management (Mikulski *et al*., 2011). While genetic improvement is taking place, using inherent local chicken characteristics to develop new strains suitable for prevailing and future situations there are also concerns on the erosion of genetic diversity either through crossbreeding or total replacements (Mendelsohn, 2003). Given

the preference for local chicken meat due to its unique taste and other adaptation qualities, breeders have adopted breeding strategies that improve local chicken and at the same time ensuring that the desirable characteristics of local chicken are somehow maintained (FAO, 2009). However, given the mode of production in rural areas, maintaining such desired purity is difficult as the strain will often interbreed with other strains creating none descript strains with variable productivity levels.

Currently, the African Chicken Genetic Gain (ACGG) project is testing highly productive imported strains of chicken such a Sasso, Kuroiler, and Black Australorp under different agro-ecological zones in Tanzania. The objective is to assess their productivity and preferences under moderate inputs production systems. Eventually, the project intends to select some of the preferred strains and establish a system of multiplication and delivery to the farmers. The new strains could be considered as innovations, with expected higher performance relative to the local strains; farmers have to adapt management packages that maximize productivity albeit under low inputs (ACGG, 2016).

Economists investigating consumer demand have accumulated considerable evidence showing that consumers generally have subjective preferences for characteristics of product attributes (Sata, 2013). However, when introducing new agricultural technologies or innovation one needs to establish the perceptions of end-users of the technology. Focusing on the farmers' perception is very important for adoption since they are the ones expected to use the technologies lest they perceive the technologies differently to the expectations of the researchers (D'Antoni *et al*., 2012). For example, Getu (2014) reported that farmers' ratings of indigenous chickens for various traits/trait categories compared to a reference exotic breed revealed the important adaptive attributes of indigenous chickens. The adaptability of an animal is generally described in terms of traits enabling them to

survive, reproduce, and be productive in the limits of their production conditions (Dadi, 2015). Despite their adaptive qualities, economics reasons in terms of production, consumption, and transfer of wealth drive some farmers to go for high yielding breeds. The question is if communities and consumers will change their preference in favor of the introduced strains what will be the impact on the population of local chickens?. Likewise, there is a general public perception that the wide adoption of improved chicken strains may pose a risk by threatening the local chicken populations. However, information on how the farmers perceive the introduced chicken strains compared with the existing local ones is generally lacking. This study was therefore conducted to address the knowledge gap and inform initiatives and strategies to improve chicken productivity in rural and peri-urban areas of Tanzania.

Existing studies that investigate the adoption of new agricultural technology in developing countries have failed to consider how farmers' subjective perceptions and subsequent preference of technology affect their adoption decisions (Adesina and Baidu-Forson, 1995). Sata (2013) revealed that consumers of technologies use subjective preferences for characteristics of desired products and that these preferences are normally formulated by their perceptions of the product's attributes. This study, therefore, aims at investigating the general community perception following the introduction of improved chicken strains.

1.2 Selection and Breeding Preferences, Objectives and Trait Preferences of Chickens

Most of the livestock keepers are keeping the local chicken through which when are improved by proper breeding practices will increase the productivity of local chicken and contribute to the increase of nutritional status and reduce poverty to the rural livestock keeper (Gondwe and Wolllny, 2014). Often traditional breeding systems are lagging in

pursuing improved genetics of the strains kept. However, improvements need to take into account local preferences (Bekerie, 2015).

For example in Malawi, it was reported that a male bird is borrowed for breeding purposes and the agreement is done on either returning a female bird or two birds which seem to be affordable among themselves. During the exchanging of these birds, they are selecting birds that are phenotypically different from their stock. At the household level, the selection is done based on the growth rate, large body size, high egg production, hatchability, good mothering ability and feather type (Okeno *et al.*, 2011). Other traits may include plumage color, body weight, broody behavior and comb-type (Markos *et al*., 2016). Farmers usually need a breed of animals that have high productivity. They have their most preferred traits which they need to be improved by the breeders to increase animal productivity. Dana and Waaij, (2010) pointed that, to improve the productivity of local chicken there are traits which farmers desire to be improved, including; adaptation traits specifically disease and stress tolerance, flightiness and scavenging vigor, growth in males and number of eggs in female, and reproduction traits. On the other hand breeding objectives can be for egg or meat production, income generation, and cultural or religious roles. Breeding programs should consider these traits if they intend to improve the productivity of local chicken (Addisu *et al.*, 2013).

1.3 Perception of Community on Improved Chicken Strains

Connected to preference, one needs to do an ex-ante evaluation of the perception of the community on new technology. Perception, in this case, describes the attitude or way of life held by different people about how something looks like (Ogalleh *et al*., 2012). This is a process on which information is received and interpreted emotionally which creates awareness which influences the way people do things (James, 2015). Perception can be

influenced by the level of education, location, livelihood activity, gender, and age of the farmers. Generally, farmers perceived that demand and price of eggs and meat from local chicken are increasing but they believe that additional inputs will not increase the income (Bishop, 2008). They also believe that to vaccinate and provide good managerial practices to the local chicken leads to an increase in chicken performance as compared to the improved chicken strains. It may result in increased egg production and carcass quality and quantity but may not lead to profitability (Bishop, 2008).

Any innovation is said to be useful when is adopted by farmers. If the improved chicken strains are not positively adopted by farmers or perceived wrongly, even if are highly productive they will mean nothing to farmers (Oladele and Fawole, 2007). For the improved chicken strains to perform well they need good managerial practices and the farmer should be committed to that. The profitability is lowered due to the costs incurred on vaccination, housing, and feed cost. Hence, the perception of farmers is highly affecting their decisions towards the adoption of innovations. The perception of farmers on the improved chicken strains could also be affected by the awareness of improved chicken strains and their physical characteristics (Oladele and Fawole, 2007).

The specific objectives were;

i. To identify and prioritize the breeding objectives and trait preferences of chicken producers (PAPER- I).
ii. To examine the perception of communities on improved versus local chicken strains about productivity, adaptability, and local chicken biodiversity maintenance (PAPER-II).

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CHAPTER TWO

2.0 PAPER I

Breeding Objectives and Producers' Chicken Trait Preferences in Morogoro and Singida Regions, Tanzania

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ABSTRACT

This study was carried out to assess the breeding objectives and trait preferences of chicken keepers in Morogoro and Singida regions, Tanzania, using a sample size of 120 households selected purposefully for the survey. Data were gathered using Household Survey and a check-list for Focus Group Discussions (FGDs). A non-parametric test was used to generate descriptive statistics, and qualitative information gathered during FGDs was analyzed using the Content Analysis Approach. The generated mean ranks were assessed using Kendall's Coefficient of concordance (W) to test for the agreement of the ranking between the respondents on the information related to breeding objectives and trait preferences. The results of the mean ranks indicated that both local and improved chickens were mainly kept for revenue (1.28) and home consumption (1.84) in Morogoro and Singida region. Local chickens were preferred due to their higher adaptability (2.00) and brooding behavior (2.13), while egg production (1.45) and meat yield (1.80) was the major traits preferred for the households rearing improved chicken in both regions. The findings underscored breeding objectives and trait preferences as crucial for the development of holistic and sustainable genetic improvement of local and improved chickens in rural areas.

Keywords: adaptability, breed, genetic, improved chickens, chicken traits, local chickens

1.0 INTRODUCTION

In developing countries, the production of local chicken is an important economic activity providing high-quality protein and income to satisfy the ever-increasing human population both in the rural and urban areas. In rural areas, many farmers keep local chicken because they are highly adapted to environmental conditions with low inputs and management requirements (Kperegbeyi *et al*., 2009). Local chickens are distributed in different areas of Tanzania with wide genetic diversity for many traits (Guni and Katule, 2013). However, local chickens are generally characterized by low production of eggs and meat which is caused by poor management practices, including poor nutrition and disease control (Lymo, 2013).

For the past few decades, efforts have been made to improve the productivity of local chicken in developing countries using a variety of improved strains to address the problem of low productivity (Dana, 2011; Addisu *et al.*, 2013). However, such efforts have been faced with a number of challenges, including the problem of low rate of adoption resulting from the failure on the side of breeder, to recognize the breeding objectives and trait preference of chicken keepers, despite the potential for high productivity of eggs and meat that meet market demand while increasing farmer's income (Sebho, 2016).

Chicken breeding for eggs and meat production is an exceedingly complex process requiring effective and accurate selection of traits, to ensure that the final cross-bred commercial bird possesses all the required attributes (Markos *et al*., 2016). This implies that for any chicken breeding program to be successful the breeding objectives and trait preferences of the target chicken keepers have to be identified and prioritized (Dana, 2011; Chebo and Nigussie, 2016). In addition, it also requires a comprehensive characterisation of production circumstances and identification of breeding practices and trait of economic

importance to farmers (Abdelqader *et al.*, 2007), as well as a thorough understanding of the farmers' selection practices and traits that are perceived by farmers, marketers and consumers to be of economic importance (Okeno *et al*., 2011).

In Tanzania, some similar initiatives have been launched to address poverty, women, and youth empowerment. These initiatives have mainly focused on brooding and multiplication of improved chicken lines/strains for smallholder farmers in rural and peri-urban areas. Of recent, two tropically improved strains of chicken were tested in five agro-ecological zones of Tanzania, in an attempt to improve the genetics of rural chicken (ACGG, 2016). However, information on how the beneficiaries have perceived the introduced strains compared to the existing local ones is generally lacking. This study was therefore conducted to address this knowledge gap and inform initiatives and strategies to improve chicken productivity in rural and peri-urban areas of Tanzania.

2.0 METHODOLOGY

2.1 The Study Area

The study was conducted in Morogoro and Singida regions, Tanzania where the African Chicken Genetic Gain (ACGG) project has been testing two tropically improved chicken strains namely; Sasso and Kuroiler. The two regions were purposefully selected to represent hot and humid (Morogoro) as well as semi-arid (Singida) regions of Tanzania.

2.2 Sampling and data collection methods

A multi-stage sampling technique was adopted to select respondents for the study. In the first stage in each of the two study regions, one district was randomly selected considering the poultry rearing activities. This was followed by purposeful selection of two wards from each division, and two villages from each ward which was chosen randomly.

Finally, a sample of 120 respondents from ACGG and non ACGG households were randomly selected. The study villages were Kibaoni, Kikwawila, Lipangalala, and Lumemo in Ifaraka mji district, Morogoro region and Mampanta, Kinambeu, Idodyandole and Heka in Iramba district, Singida region. In these villages two strains of tropically improved strains namely. Sasso and Kuroiler were issued for testing of performance under moderate input farmer-managed production systems. According to Kadam and Bhalerao (2010) UNC (2010) sample size was calculated as follows;

$$ME = z\frac{\rho\sqrt{(1-\rho)}}{n} \quad \ldots\ldots(1)$$

Where z =1.96, ρ =0.04 and ME= the desired error margin thus assuming normal error margin of 4%,

$$0.0384 = z\frac{0.04\sqrt{(1-0.04)}}{n} \quad \ldots\ldots(2)$$

$$n = (0.04 * (0.96)/(0.0384/1.96)^2) = 100.04 \approx 100 \quad \ldots\ldots(3)$$

The sample size used was 120 individuals who were convenient for statistics analysis. The individuals were purposely selected for interviews based on their engagement in both local and improved chicken value chains either as a primary producer, consumer, or traders. Traders were those who engaged themselves in selling both local and improved chickens while consumers were selected if they have had an opportunity to test both local and improved chicken products (meat and eggs). Thus, the study interviewed 20 ACGG project households, 20 non-project households, 12 consumers and 8 chicken traders from each region that bring out 120 respondents.

Survey techniques using a semi-structured questionnaire and a checklist for Focus Group Discussion (FGD) were used as a tool for data collection. The formal survey which involved a single visit was employed to gather information on breeding objectives and trait preferences of the chicken keepers. The FGD was made in each village involving

chicken keepers, consumers and traders. It involved one session for each group of improved chicken keepers, local chicken keepers, traders and consumers with each session having between 5 and 10 participants.

2.3 Data Management and Analysis

Data obtained from the survey were analyzed using SPSS version 20 and significant differences were analyzed using non-parametric statistical tests. The agreement of the ranking between the respondents on the data obtained from the breeding objectives and trait preferences were assessed using Kendall's Coefficient of concordance (*W*). According to the test, a *W* value greater than 0.38 indicates that the agreement was good and statistically significant. Specifically, Kendall's W statistic was calculated following the procedure described by Legendre (2010). The first step entailed the calculation of sum-of-squares (*S*) over the low sums of rank (R_i), and the mean of R_i values.

($\bar{R}$) as follows:

$$S=\sum_{i=1}^{n}(R_i-\bar{R})^2 or S'=\sum_{i=1}^{n}R_i^2=SSR \quad \text{(1)}$$

Following that, Kendall's W statistic was then computed as shown in the following formula:

$$W=\frac{12S}{m^2(n^3-n)-mT} \quad \text{(2)}$$

Where *n* represents the number of objects; *m* is the number of variables and *T* is a correction factor for tied ranks which is calculated as follows:

$$T == \sum_{k=1}^{g} \left(t_k^3 - t_k \right) \quad \text{……..……...}$$

(3)

Where, *tk* is the number of tied ranks in each (*k*) of g groups of ties. The sum was computed overall groups of ties found in all m variables of the data worksheet. *T* equaled zero when there were no tied values. Kendall's *W* is used as an estimate of the variance of the row sums of ranks R_i divided by the maximum possible value the variance can take; this occurs when all variables are in total agreement. Hence, $0 \leq W \leq 1$(1 represents perfect concordance).

3.0 RESULTS

3.1 Respondents Characteristics

It was found that 80% of the respondents were older than 30 years compared to other age groups 25-30 years (13.8%), and < 25 years (6.2%) (Table 1). About 72.5% of the respondents had primary school education.

Table 1: Characteristics of interviewed chicken keepers

		ACGG project Farmers (%) n=40	Non-ACGG project Farmers (%) n=40	Total n=80
Sex	Male	41.9	32.4	37.5
	Female	58.1	67.6	62.5
Age	<25	9.3	2.7	6.2
	25-30	11.6	16.2	13.8
	>30	79.1	81.1	80
Education	Non formal	2.3	0.0	1.2
	Primary	72.1	73.0	72.5
	Secondary	23.3	21.6	22.5
	College	2.3	5.4	3.8

Experience in keeping chickens	<5	16.3	24.3	20
	5-10	37.2	21.6	30
	>10	46.5	54.1	50

Note: Numbers in parentheses represent percentages (%)

3.2 Breeding Objectives and trait Preference Ranking

Results from the mean ranking indicate that the overall ranking of breeding objectives from the first to the last was a source of revenue (1.28), home consumption (1.84), cultural values (3.09) and prestige (3.78), for the two regions viz. Morogoro and Singida (Table 2). On the overall, it appears that both improved and local chicken keepers were having similar breeding objectives. The agreement of the ranking was good and significant (W= 0.784).

Table 2: Participants response on breeding objectives of the chicken keepers

Objectives	Mean ranks
Revenue	1.28
Consumption	1.84
Cultural	3.09
Prestige	3.78

N=80, Kendall's W=0.784, P-value= 0.000
Kendall's Coefficient of Concordance

3.3 Participants response on trait preferences

It was observed that the most preferable traits in local chickens by farmers were adaptability (2.00) and brooding behavior (2.13) while from the improved chicken strains the preferences were egg production (1.45) and meat yield (1.80) (Table 3).

Table 3: Mean rank of chicken keepers trait preferences

Trait preference	Mean Rank	
	Local chickens	Improved chickens
Plumage color	4.36	4.27
Adaptability	2.00	3.99
Meat and egg taste	3.42	3.49
Brooding	2.13	-
Hatchability	3.10	-
Egg production	-	1.45

Meat yield	-	1.80
	N=80, Kendall's W =0.384,	N=40, Kendall's W=0.668,
	Chi-Square= 122.906,	Chi-Squire=117.620,
	P-value= 0.000	P-value= 0.000

W=Kendall's Coefficient of Concordance.

4.0 DISCUSSION

The findings have shown that one half (50%) of the respondents have had experience in keeping chicken for more than 10 years, which allows them to consider the advantages and disadvantages of improved chicken strains. Slightly over two-thirds of the project farmers were members of social/productive groups which enabled them to meet, discuss and also receive training on several issues concerning their chicken. On the contrary, 67.6% of the non-project farmers were not members of any group. According to Thi *et al.* (2002), being in groups is more advantageous to improve farm productivity since development partners and the government can easily provide different services to farmers as a group.

Consumption of chicken meat and sale of live adult chicken were considered to be more important in this study than the other breeding objectives like sale and consumption of eggs and at home. ACGG (2016) confirms this finding when in their respective study; they observe that mainly farmers are keeping chicken as a source of income (eggs and live bird sales) and for home consumption. It was also reported in Zimbabwe and Ethiopia by Muchadeyi *et al.* (2007); Bekerie (2015) and Markos *et al*. (2016) that, farmers identified objectives that have relatively tangible benefits such as a source of income and cultural use. Slaughtering a chicken for an important guest is an enshrined culture in most African societies, thus a household tends to maintain few chickens in a household to serve for this and other purposes. Other studies in African countries identified that cultural role and other non-monetary values attached to chicken are conducted to many societies as an important cultural value (Abdelqader *et al.*, 2007; Mapiye *et al.,* 2008; Markos *et al*.,

2016). Concerning trait preference, it was observed that adaptability (2.00), brooding behavior (2.13), and hatchability (3.10) were ranked higher followed by meat and egg taste (3.42) and plumage color (4.36). Dana *et al.* (2010) in Ethiopia reported that farmers' ratings of local chickens for various traits/trait categories compared to a reference improved chicken revealed the important adaptive attributes of local chickens.

This study observed that the production traits from the improved chicken strains are highly preferred including the meat yield and egg production and they can adapt to the local environmental conditions given good managerial practices (Prayaga *et al*., 2003). The current study observed that, meat and egg taste from the improved chicken strains and the plumage color did not affect the preference of the farmers and the chicken market, which seems to be contrary to the report from Markos *et al*. (2016) who reported that farmers and the chicken market do prefer mostly the plumage color which is mixed and the black color.

Kendall’s coefficient for egg production (1.45) and meat yield (1.80), were higher for improved chickens followed by meat and egg taste (3.49), adaptability (3.99), and plumage color (4.27) (Table 3). It was observed that the improved chicken strains are high producing and their products taste (meat and eggs) look like those from the local chicken products. Contrary to this study, reports from other studies especially those focused on local chickens attributes observed that local chicken products are highly preferred despite the small size of eggs and low meat yield (Dana, 2011; Bekerie, 2015; Chebo and Nigussie, 2016). Overall, it was observed that farmers have their own informal breeding goals and therefore, preference and selection by farmers intend to achieve such goal (Okeno *et al*., 2011).

However, during the FGDs male respondents showed a preference for adaptability, many eggs, and high meat yield as being important, while female respondents showed a higher preference for birds that lay many eggs, sit on eggs and able to give good hatchability. This may be interpreted that men intended to keep birds that reduce management cost (scavenging ability) but, yet the birds should fetch reasonable income upon a sale. On the other hand, women put more priority on household nutrition (egg consumption) and need to increase their flock size.

As for consumers, the most prominent preferences were meat and eggs from the local chicken because they were highly valuable and considered to be “organic” compared to improved chicken strains. Moreover, the majority of respondents did not discriminate against the taste of eggs from the improved strains. Eggs from improved strains were equally liked because of their large size and yet have comparable internal characteristics including yellow yolk just like those of local hens. The attainment of the yellow yolk is a result of access to greens, in that the project promoted a semi-scavenging mode of production to offset high feeding costs for improved strains of chicken.

Traders, on the other hand, showed an inclination to local chicken due to its availability and market preference. It should also be noted that the test strains were still new in the localities and they will take time to gain acceptability mainly by consumers in urban areas. Previous studies done in Tanzania and Ethiopia reported a tendency for farmers to perceive that raising exotic chicken is costly, needs more care, higher feed requirements and that they are susceptible to diseases and predators compared to local chickens (Ogali, 2011; Abadi, 2017). Moreover, results and observation from the current study gave indications that the improved chicken strains require moderate care and feeds costs were partially offset by allowing the birds to scavenge.

5.0 CONCLUSIONS

It is concluded that adaptation and reproductive traits were the most important attributes of local chicken, while the production traits including the number of eggs and meat yield were considered to be more relevant for those keeping improved chicken strains. For sustainability and economic empowerment of rural farmers, breeding objectives should, therefore, take into account the breeding goals and preferences of farmers, traders, and consumers.

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CHAPTER THREE

3.0 PAPER II

Community Perceptions on Improved Versus Local Chicken Strains in Morogoro and Singida regions, Tanzania

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ABSTRACT

The study was conducted in two regions of Tanzania namely, Morogoro and Singida to investigate perceptions on improved versus local chicken strains and implications to local chicken biodiversity conservation. The study interviewed 120 respondents who were

purposely selected from the study villages. A household survey technique was complemented by focus group discussions. A multiple regression analysis was run to determine the degree to which some social-economic and social-demographic variables influenced the perceptions of improved versus local chickens. Besides, a Likert scale was used to gauge the perception of respondents. Various variables describing adaptability, productivity and implications to the local chicken maintenance were used. Respondents were requested to indicate whether they strongly agree, agree, neutral, disagree, and strongly disagree according to the statement asked. The results indicated that the average flock sizes number were 13.4±11.2 and 20.8±11.2 chicken per household for the improved and local chicken strain respectively. More than 38% of the respondents and during the FGDs, it was reported that management costs of the improved chicken strain are higher than that of local strains although the former has better performance and farmers were ready to increase the flock size. More than 50% of the respondents reported that the adaptability of local strain in terms of diseases, stress, and escape from predators is superior to improved strains. However, during the FGDs as well as over 60% of the respondents had the opinion that the introduction of improved chicken strains will not lead to the erosion of local chicken strains. The government in collaboration with NGO's should increase the distribution of the improved chicken strains to the rural areas as are highly preferred due to their productivity. It is recommended that go behind up-scaling activities should be monitored, such that it will not erode the local chicken genetic resources biodiversity.

Keywords: Chicken, conservation, genetic resources, innovations, management

1.0 INTRODUCTION

Economists investigating consumer demands have accumulated considerable evidence showing that consumers generally have subjective preferences for characteristics of product attributes (Sata, 2013). However, when introducing new agricultural technologies

or innovation one needs to establish the perceptions of end-users of the technology. Understanding and considering the perceptions of farmers about innovation or technology may facilitate or hinder the adoption of interventions as farmers can perceive technologies differently than researchers and extension agents (D'Antoni *et al*., 2012).

The African Chicken Genetic Gain (ACGG) project has introduced and tested various tropically adapted breeds such as Sasso and Kuroiler in various agro-ecological zones of Tanzania. The project has the objective of collecting data on chicken breeds that will be preferred by smallholder farmers. The preference could be in terms of eggs, meat productivity and overall adaptability under low input production systems (ACGG, 2016). Preliminary analysis from the ACGG project has shown the superiority of the introduced strains over the local strains and an inclination towards the demand for the test strains (*ibid*). Other players have also been encouraged by the performance and larger projects such as the Poultry Multiplication Initiative (PMI) are currently multiplying the two strains and distributing them to the rural communities in Tanzania.

The new strains are considered to be the innovations although the adoption of improved strains entails a trade-off that needs farmers to invest more and in doing so they lose the benefits that they get from keeping local chickens. Farmers could get high productivity of eggs and meat from improved chicken strains though under the moderate cost of management practices, on the other hand, could lose the adaptive features from the local chickens. The trade-off could also include the availability of raw materials, technology, capital, and the market for their products (Klapwijk *et al*., 2014). Likewise, there is a general public perception that the wide adoption of improved chicken strains may pose a risk if they become highly preferable and adopted by threatening the genetic diversity of local chicken populations. Perception describes the attitude or way of life held by different

people about how something looks like (Ogalleh, *et al*. 2012). This is a process on which information is received and interpreted emotionally hence creates awareness which influence the way things are done. Perception can be influenced by the level of education, location, livelihood activity, gender and age of the farmers (James, 2015). The objective of this study was to assess the perceptions of farmers regarding improved chicken strains and their implications on the conservation of local chicken biodiversity.

2.0 METHODOLOGY

2.1 Description of the Study Area

The study was done in two regions; Morogoro and Singida, Tanzania where improved chickens were introduced by the ACGG project.

2.2 Sampling and Data Collection Methods

One district was randomly selected for the study in each of the project regions. Four villages from Ifaraka town, Morogoro region (Kibaoni, Kikwawila, Lipangalala, and Lumemo) and four villages from Iramba district, Singida region (Mampanta, Kinambeu, Idodyandole, and Heka) were purposely selected being the beneficiaries of ACGG project. In these villages, two strains of tropically improved strains (i.e. Sasso and Kuroiler) were issued for testing of performance under moderate input farmer-managed production systems. According to Kadam and Bhalerao (2010), the sample size was calculated as follows;

$$ME = z\frac{\rho\sqrt{(1-\rho)}}{n} \quad \text{..} (1)$$

Where z =1.96, ρ =0.04 and ME= the desired error margin thus assuming normal error margin of 4%,

$$0.0384 = z\frac{0.04\sqrt{(1-0.04)}}{n} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$0.04 * 0.96 / \left(\left(\frac{0.0384}{1.96}\right)^2\right) = 100.04 \approx 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$n = ¿$$

A total of 120 individuals were purposely selected for interviews based on their engagement in the chicken value chain either as a primary producer, consumer, or traders. Specifically, 20 project households, 20 non-project households, 12 consumers, and 8 chicken traders were interviewed in each region. The ACGG project households were given 25 pre-brooded and vaccinated birds of either Sasso or Kuroiler. They were advised to combine scavenging and feed supplementation to reduce management costs. The project farmers were selected based on their experience in chicken keeping and willingness to construct a chicken shed and provide basic managerial practices such as supplementary feeds, treatment, and prevention of diseases. Traders were those who engaged themselves in selling both local and improved chickens while consumers were selected if they have had an opportunity to test both local and improved chicken products (meat and eggs). A semi-structured questionnaire and Focus Group Discussion (FGD) interview guide were used for data collection. A single visit formal survey was employed to collect information on the perception of chicken keepers on improved chicken strains and implications for the conservation of local chicken. The FGD was done in each village involving chicken keepers, consumers, and traders each session having between 5 and 10 participants. One session was involved for each group of respondents namely project farmers, non-project farmers, traders, and consumers.

2.3 Data Management and Analysis

Qualitative and quantitative data sets were analysed using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were generated and included

frequencies, means, and standard deviations. Besides, a Tobit model as described by Enami and Mullahy (2009) was used to determine the association between response values and explanatory variables (Table 1). The variables of interest are such as the socio-economic, institutional, socio-demographic as described by Kadigi (2013). The variables were included categorical in a form of Likert scale and dummies in a form of 1, 0 specifications. The model is described using the following equation;

$$Y^{¿} = \beta_0 + x\beta + u, u \vee x \;\; Normal(0, \sigma^2) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where; $Y^{¿}$ = latent variables, x = independent variables, u = error term

Table 1: The summarized description of explanatory variables

Variable	Variable description	expected sign
Age	Age of household head (years)	+ or –
Sex	Sex of household head	+ or –
Education level	Years spent an informal school for the household	+
Experience	Keeping experience for the household	+
Market accessibility	Market accessibility (1=if accessed,0 otherwise)	+
Extension availability	Extension availability (1=if available, 0 otherwise)	+

A Likert scale was used to gauge the perception of the improved chicken strain and implications for the conservation of local chickens. Various variables describing adaptability, productivity and implications to the local chicken maintenance were used. Respondents were requested to indicate whether they strongly agree, agree, neutral, disagree, and strongly disagree according to the statement asked. It was treated that the strong agreed and agreed indicate that a farmer prefer the improved chicken strain and disagreed or strongly disagreed connoted that a farmer did not prefer the improved chicken strains. Neutral responses were considered that the respondents had no opinion.

3.0 RESULTS

3.1 Respondent's Demographic Characteristics

The findings of the study show that out of the sampled respondents, 62.5% were females and 37.5% were males. It was also found that 80% of the respondents were had age above 30 years compared to other age groups 25-30 years (13.8%), < 25 years (6.2%) (Table2). On levels of education the findings indicate that 72.5% of the respondents had a primary school education level, this means that they are likely to be literate enough to understand and discuss their perception of the improved chicken strains and implication to the conservation of local chicken. About one-half (50%) of the respondents had experience in keeping chicken for more than 10 years, which allows them to consider the advantages and disadvantages of any innovation like the introduction of the improved chicken strains.

Table 2: Respondents characteristics of the interviewed chicken keepers

		Project farmers (%) n=40	Non-project farmers (%) n=40	Total n=80
Sex	Male	41.9	32.4	37.5
	Female	58.1	67.6	62.5
Age	<25	9.3	2.7	6.2
	25-30	11.6	16.2	13.8
	>30	79.1	81.1	80
Education	Non formal	2.3	0.0	1.2
	Primary	72.1	73.0	72.5
	Secondary	23.3	21.6	22.5
	Collage	2.3	5.4	3.8
Experience	<5	16.3	24.3	20
	5-10	37.2	21.6	30
	>10	46.5	54.1	50
Institutional membership	Members	62.8	32.4	48.8
	Non-members	37.2	67.6	51.2

3.2 Perceptions of Farmers

It was observed that perceptions of farmers towards the improved chicken strain were not affected by most of the independent variables included in the study (Table 3). The desire to increase the number of improved chicken strains was significant at ($P<0.05$).

Table 3: Results of the Tobit perception index from the two regions

Independent variable	Regression values for perception model	
	Coeff.	P-value
Location	0.019187	0.543
Sex	0.05325	0.071
Age	0.00007	0.959
Education level	0.0297469	0.320
Experience	0.0006098	0.727
Household size	0.0089909	0.275
Total local number	-0.0004465	0.494
Total improved number	-0.0000902	0.464
Preferable chicken type	-0.0350747*	0.022
Lambda	0.5289808	
Number of observation (project farmers)	40	
Censored observation	3	
Uncensored observation	37	
Chi- squire	9.62	
Pseudo R^2	0.0380	

* = Significant at 5% probability level.

3.3 Flock size and Composition of Improved and Local Chicken Strains

The overall average flock size in the study areas was found to be 13.5±11.2 and 20.8±11.2 chicken per household for the improved and local strain respectively. For the improved chicken strains, the flock was dominated by laying birds 5.3±3.9 followed by cocks 3.3±2.3 while the flock for the local chicken strain was dominated by chicks 8.8±7.8 followed by the laying birds 5.2±3.8 (Table 4).

Table 4: Flock size and composition of improved and local chicken strains (Mean ± s.d.)

Stock composition	Morogoro N=20	Singida N=20	Total N=40
Improved strain			

Total improved	11.0±6.8	15.5±13.8	13.4±11.2
Laying birds	4.4±2.6	6.0±4.74	5.2±3.9
Pullets	2.61±1.3	2.5±1.85	2.5±0.27
Cocks	2.3±3.106	4.1±1.1	3.2±2.3
Chicks	1.6±0.2	2.9±1.4	2.3±1.9
Local strain			
	N= 40	**N=40**	**N=80**
Total local	21.9±11.1	19.7±11.4	20.8±11.2
Laying birds	4.2±2.4	6.2±4.5	5.1±3.7
Pullets	4.2±3.3	4.5±3.4	4.3±3.3
Cocks	2.0±1.8	2.9±2.6	2.4±2.2
Chicks	11.5±7.7	6.1±5.1	8.8±7.8

3.4 Perception of Farmers on the Chicken Strain Management Cost

Table 5 shows that 90.9% and 63.6% of the household heads in the study area responded that the housing and feeding costs for local chicken were low compared to that for improved chicken strains. However, a good proportion of the interviewees, 38.6% also perceived the cost of managing improved chickens to be affordable. On average more than 50% of the respondents said that the medication costs regardless of the strain were high whilst, about 43% considered the cost to be moderate.

Table 5: Chicken management costs

Type		**Morogoro**	**Singida**	**Total**	**Overall**
		%	**%**	**%**	**Percentage**
Housing cost: local	Low	19	21	40	90.9
	Average	2	2	4	9.1
Housing cost: improved	Low	0	1	1	2.3
	High	19	20	39	88.6
	Average	2	2	4	9.1
Feeding cost: local	Low	20	8	28	63.6
	High	1	15	16	36.4
Feeding cost: improved	Low	1	0	1	2.3
	High	18	8	26	59.1

	Average	2	15	17	38.6
Medication cost: local	Low	19	5	24	54.5
	Average	2	18	20	45.5
Medication Cost: improved	High	20	5	25	56.8
	Average	1	18	19	43.2

3.5 Preferable Chicken Strains

The findings in table 6 indicate that more than half of the respondents (56.8%) were willing to increase the improved strains flock size, and take advantage of the increased number of eggs and the bigger size of birds. 38.6% were willing to increase both local and improved chicken strains so that they can use the local hens to brood and hatch eggs from improved chickens. However, few respondents (4.5%) wanted to increase only local chickens due to their ability to tolerate harsh environmental conditions and diseases.

Table 6: Preferable chicken strains

Types of chicken strain	**Morogoro N=20**	**Singida N=20**	**N=40**	**Percentage (%)**
Increase local	2	0	2	4.5
Increase improved	13	9	22	56.8
Increase both local and improved	5	11	16	38.6

3.6 Perception of Farmers on Local versus Improved Chicken Strains

The results of adaptability as indicated in Table 7 show that 85.7% and 56.5% of the respondents from Morogoro and Singida respectively, disagreed that adaptability in terms of diseases, stress, and escape from predators of improved chicken strains is superior to local chickens. There was a strong disagreement among chicken farmers (>90% of

respondents) that the introduction of improved strains will bring in diseases that were not there before. Moreover, on productivity (eggs and meat), 95.2%, and 87.0% of the respondents from Morogoro and Singida respectively agreed that improved chicken strains have superior productivity of eggs and meat compared with that of the local chickens.

While, the community and some researchers are skeptic that introduction of improved strains will have negative impact on conservation of local strains, this study identified that, 61.9% and 82.6% of the respondents from Morogoro and Singida respectively perceived that introduction of improved chicken strains will not endanger the population and genetic diversity of local chickens. Likewise, 66.7% and 78.3% of the respondents in Morogoro and Singida respectively were pessimistic that the introduction of improved strains will ultimately make the local strain lose their social-cultural values. The marketing system for improved strains seems not to be a problem as attested by 81.0% and 73.9% of the respondents in Morogoro and Singida respectively because they are highly needed by farmers to improve their local flocks' productivity. Likewise, most of the respondents (85.7% and 82.6% in Morogoro and Singida respectively) viewed market information for chicken as not a major problem due to the available networking system of getting information.

Table 7: Perception of farmers on local versus improved chicken strain on adaptability, productivity, and conservation of local chickens

S/NO.	Arguments	Percentage score on the scale							
		Morogoro (N= 20)				Singida (N = 20)			
		Agree (%)	Neutral (%)	Disagree (%)	Total (%)	Agree (%)	Neutral (%)	Disagree (%)	Total (%)
1.	Introduction of improved chicken strains will not endanger the population and genetic diversity of local chickens	61.9	0	38.1	100	82.61	0	17.39	100
2.	Introduction of improved strains will bring in diseases that were not there before	4.8	4.8	90.4	100	8.7	0	91.3	100
3.	Introduction of improved strains will make the local strain lose their social-cultural values	33.3	0	66.7	100	21.7	0	78.3	100
4.	Adaptability in terms of diseases, stress and escape from predators for improved chicken strains is superior to for local chickens	14.3	0	85.7	100	43.5	0	56.5	100
5.	Available infrastructures (road, market) satisfy a market system of chickens	90.5	0	9.5	100	87.0	0	13.0	100
6.	Improved chicken strains have superior productivity attributes (e.g. egg and meat production) than local chickens	95.2	0	4.8	100	87.0	0	13.0	100
7.	The market of improved chicken strains in terms of demand, price and profit margin is better than the local chicken market	81.0	0	19.0	100	73.9	0	26.1	100
8.	Information about the chicken market systems is readily available	85.7	0	14.3		82.6	0	17.4	100

4.0 DISCUSSION

In this study, the sex of the household head was hypothesized to significantly influence the perception of farmers on the improved chicken strains. Contrary to this study Thi *et al.*, (2002) indicated that normally women are busy caring for children and other household tasks hence, they have little time to engage in any innovation or technology. However, this study observed that both men and women were equally responsible for chicken keeping activities.

There was no significant difference in perceptions between men and women. Both sexes perceived keeping the improved chickens to be more productive and beneficial than keeping local chickens alone. It should be noted that the project targeted females as the main beneficiaries, as one of the options towards economic and social empowerment. From the training offered by the project, it, therefore, appears that perceptions as described above, have led to more farmers to accept the improved chicken strains which was also observed during FGDs. Therefore, the desire to increase the number of improved chickens was significant at ($p<0.05$).

Generally slight over 50% of the respondents wanted to increase the number of improved chicken because of their better performance and good market prices for eggs and meat. The acceptability of the improved chicken augers well with the objective of the project implying that wider adoption of improved chicken will contribute towards narrowing the gap between demand and supply of both chicken meat and eggs by increasing production to satisfy the market (Sebho, 2016 and Ogali, 2011). This implies that those farmers adopting the new strains need to make improvements to optimize the genetic potential of these strains. It was also observed that the location of the study area, age, educational level, and experience (Table 2) did not significantly influence the perception of farmers on

improved chicken strains. These findings contradict with that of many other studies which reported location, age, education level, and experience to significantly influence the perception of farmers on innovations or technologies (Adesina and Baidu-Forson, 1995; Kadigi, 2013; James, 2015).

With regards to flock size, the sampled households in the Morogoro region had slightly higher (21.9±11.1) number of local chickens compared to their counterpart households in the Singida region (19.7±11.4). The flock size for the improved strains was low and explained by the fact that each participating household was given only 25 birds. The number remaining during the study and the wider variation (standard deviation) is a function of losses resulting from diseases, predation, and theft. Also, it was 12 months from when farmers were given the birds to the time of the survey. Generally, during FGDs the respondents argued that management cost of improved strain was moderate though slightly higher than for local strains which are often provided with zero inputs (Table 4). Farmers felt that they can manage to provide additional supplements for most of the year and the cost was reduced significantly since birds were allowed to scavenge around the homestead.

Due to the fact that birds could scavenge just like the local strains made the improved chickens more appealing to farmers leading to influence their willingness to increase their flock sizes. More eggs allow the farmers to use some for their home consumption and sell the surplus. These findings were in line with the expected ACGG project outcomes as reported by Esatu *et al.* (2016) following their baseline survey. It was not surprising to see that 38.6% of the respondents were willing to increase both local and improved chicken strains. It was also observed during the FGDs that farmers were still skeptical as to whether an improved strain will be able to sustain in the local environment, but also

reasoned based on the perception that improved strains do not sit on the eggs. Few households have used the existing local chickens to hatch eggs from the improved strains, implying that where the supply chain for improved chicks is limiting it is important to maintain a small flock of local chickens as well. Unfortunately, the number of chicks was low probably due to poor fertility, hatchability, and high mortality. It was only a small fraction of all respondents (4.5%) who indicated that they would wish to maintain and increase the population of local chicken alone despite their perceived low levels of meat and egg productivity. In essence, this reasoning was centered on their experience and perception that local chickens have low management costs and are well adapted to a harsh environment. The observation was reported by Ogali (2011) in Pemba island that; keeping the improved chicken require moderate management cost but give more profit than local chickens. On the other hand, Wondmeneh *et al*. (2016) who studied the perception of farmers and simulated the impacts of the intervention on the village production system in Horro and Ada Districts of Ethiopia concluded that the improved chickens have high productivity of eggs and meat only if management is improved. In this regard, the additional costs should be offset by the expected income.

During FGDs respondents perceived improved chickens not to be a source of diseases to other flocks. This is in line with Ogali (2011) and Sebho (2016) who reported that productivity will only be affected by poor management. Furthermore, the available infrastructure (market and road) and access to marketing information in the study areas were viewed to be satisfactory by most of the respondents (90.5% and 85.7%) respectively. Kiiza *et al*. (2013) observed that the adoption of any technology and the overall performance are influenced by the extent to which farmers can access market information. Also, the majority of farmers (86%) and during FGDs had an opinion that the quality of meat and eggs from improved strains were as equally good or even better

than that of the local chicken strains. Much more is that the eggs were bigger. Getiso *et al*. (2017) reported that local chicken eggs have better egg taste than the improved chickens, which is explained by the fact that comparison was made between local and commercial intensive reared birds. Access to green during scavenging impacted the yellow pigment to the yolk, which is a desirable quality of eggs.

Interestingly, during FGDs and most of the interviewed farmers (>60%) were not worried by the assertion that improved chicken strains will lead to erosion of local chicken strains. 56.8% of the respondents wanted to increase improved chicken stocks. It was also observed that there was still a significant fraction of farmers who felt that local chickens have some characteristics that warrant them to continue being kept by rural households hence 38.6% of respondents wanted to increase both local and improved chicken strains. Contrary to the result of the current study, Getu (2014) reported that farmers' ratings of indigenous chickens for various traits/trait categories compared to a reference exotic breed revealed the important adaptive attributes of indigenous chickens, hence their preference.

Moreover, Spalona *et al.* (2007) cautioned that a wider distribution of improved strains could affect negatively the local chicken diversity in the long run. FAO (2007) also reported that poultry genetic resources are at high risk of extinction than any other species of animal as a result of being rapidly replaced by the improved breeds to satisfy the demand for meat and eggs in urban areas.

CONCLUSIONS

Most of the respondents perceived that improved chicken strains had high productivity and adaptability under a good management system. The improved chicken strains play the same role as those of local chickens. It is also concluded that farmers are not worried on the diversity of local chickens if the improved chicken strains will be distributed widely.

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CHAPTER FOUR

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Owing to the role of both types of chicken strains (improved and local) in the society, it was observed that both chicken strains were mainly kept for revenue (1.28) and home consumption (1.84) in Morogoro and Singida regions. Local chickens were preferred due to their higher adaptability (2.00) and brooding behavior (2.13), while egg production (1.45) and meat yield (1.80) was the major traits preferred for the households rearing improved chicken in both regions.

It was also found that the majority of the respondents had accepted the improved chicken strains due to their higher productivity and adaptability under the improved management. Furthermore, the improved chicken strains play the same role as the local chicken do, including saving as income source, home consumption, and other cultural values. About 2/3 of the respondents did not perceive negatively that the introduction of the improved strains will endanger the local chicken diversity if the improved chicken strains will be highly distributed. Social-economic and social-demographical factors did not affect negatively the perceptions on introduced improved chicken strains.

4.2 Recommendations

i. Animal breeders should make sure that they involve farmers, traders, and consumers to establish the breeding objectives and their trait preferences for sustainable local strain improvement.

ii. The government in collaboration with NGO's should increase the distribution of the improved chicken strains to the rural areas as are highly preferred due to their productivity.

iii. For those preferring improved strains, there is a need to develop affordable management packages that will sustain genetic improvements. Such packages shall include better feeding, healthcare, housing, artificial incubation, and brooding.

iv. The government in collaboration with other stakeholders to ensure that monitoring programs are in place lest it is assumed that the introduced strains will blend with the existing locals and create a new but better "local" bird.

v. The government and other institutions should find ways of meeting conservation goals while allowing their people to take advantage of new technologies to improve their economies.

APPENDICES

Appendix 1: Household questionnaire

I: ADMINISTRATIVE DATA

Choose the correct answer and fill a number of your choice inside the box showed

1. Region 1=Morogoro 2=Singida
2. District: 1=Kilombero 2=Singida Rural
3. Ward Name……..……
4. Village Name……
5. Street name: …….

II: PERSONAL CHARACTERISTICS

6. Sex: 1=Male 2= Female
7. Age: 1=below 18 2=18 3=above 18 (Specify…….)
8. Education level

   1=Primary 2=Secondary (4 years) 3=Advanced secondary (>4years)

   4=Collage

9. Type of chicken kept

   1=Keep local chicken alone

   2=Keep Improved chicken alone ( )

   3=Keep commercial chicken

   4=Keep both local and Improved

10. What were your income from sale of chickens and eggs in the last 2 month?

	Quantity	Value	Total (Tsh)
a) Chicken			
b) Eggs			

11. Experience: For how long you have been keeping chickens? ……Years

12. In your choice in question 8 give the number of stock you keep so far and their value if they will be sold

Breed	Number	Value	Total value
a) Local			
b) Improved			
c) Commercial			

13. What type of breed do you keep?

1=Sasso

2=Kuroiler

3=Local

4= Others……(specify)

14. Among the improved breeds you keep, which do you prefer most and wh

Rank 1……Reason……

Rank2…….Reason…….

Rank3……..……Reason……...TZS

III: INSTITUTIONAL FACTORS

15. Are you a member of any commercial/income generation group in your area?

1=Yes 2=No ( )

16. If answer in 15 is Yes, What type of organization you are a member?

i. Financial e.g. SACCOS, VICOBA……..

ii. Cooperative and Marketing e.g. AMCOS……. ( )

iii. Poultry rearing

iv. Poultry and crops

v. Others

17. How did your membership influence or benefited you in your poultry enterprise?

List the benefits

i)…….....

ii)…….....

iii)…….....

1v).....

18. By being a member has it influenced you on the type of strains/breeds you are keeping? Yes/ No If yes explain,…….....

IV: SPECIFIC OBJECTIVES

A: To identify and prioritize the breeding objectives of Local/Improved chicken producers

[You may give multiple responses if you have more than one option]

19. What is the main goal of keeping local chicken

1= Source of revenue 2= Prestige 3= Cultural value 4 = egg production 5=meat production ( ) 6= dual purpose 7=others (Speci

20. Give the rank of your objectives selected in question 19 in ascending ord your objectives. Give reasons of your ranking position

1……..Reason……

2……..Reason……

3……..Reason……

4……..Reason……

5……..Reason……

B: To identify and rank traits preferences of local and improved strains.

Traits local	Rank	Traits Improved	Rank

NB: = 1= Plumage colour 2 = Adaptability 3 = egg production 4 = Egg size, 5= egg quality 6. Meat yield (body size) 7=Meat taste 8= Brooding 9= Hatchability 10= Aggressive 11= others

C: Perceptions of communities on improved versus local chicken strains

21. What is your response with regard to the following statements?

a) Introduction of Improved chicken strains will not endanger the population and genetic Diversity of local chickens

1=stronglyAgree2=Agree3=Neutral

4=Disagree 5=Strongly Disagree

b) Introduction of improved strains will bring in diseases that were not there before

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

c) Introduction of improved strains will make the local strain lose the cultural values

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

d) Adaptability (diseases, stress) and escape from predators of improved chicken strains is superior than local chickens

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

e) Improved chicken strains have superior productivity (eggs and meat) than local chickens

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

D: To assess factors influencing perception of improved chicken strains.

22. Is extension service readily available when needed?

1= Yes 2=No ( )

23. Who provide you with advices on poultry keeping including medication

1=from government

2=From NGO (private sector) ( )

3=from stockiest /from agro-dealers

4=Others…….. (Specify)

24. Where did you get your capital to keep chicken flocks

1=from the project

2=from a lending institution (e.g. VICOBA, SACCOS, BANK, AMCOS etc.)

3=from my other sources of income ( )

4=Others……. (Specify)

25. Compare local vs improved

a) Cost of housing & accessories (feeder & drinkers, nest boxes)

Local.....

Improved.....

b) Average cost of feeding (weekly basis)

Local.....

Improved.....

c) Average cost of medications (prevention & treatments)

Local.....

Improved.....

26. In case you are asked whether you will continue to increase or decrease the stocks of either local or improved strain what is your opinion.

1=increase local

2=increase improved ( )

3=increase both

4=none of the abo**ve**

Give reason ……

27. The market of improved chicken strains is better than local chicken

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

28. Information about the chicken market systems is readily available

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

29. Available infrastructures (road, market) satisfy market system of chickens

1=strongly Agree

2=Agree

3=Neutral ( )

4=Disagree

5=Strongly Disagree

E: To be filled by non adopters only

30. Would you be interested in adopting improved chicken strains? (Yes/No)

31. If yes, what are your 5 major constraints?

i. .....

ii. .....

iii. .....

iv. .....

Appendix 2: Interview guide/checklist for Focus Group Discussion

THE QUESTIONS

1. To identify and prioritize the breeding objectives and trait preference of local chicken producers

- What are your breeding objectives?

  ……

- Can you prioritize these objectives? Y, N

  a) Meat for selling b)Meet for consumption c)Egg for selling d)Eggs for consumption e)Cultural purpose e.g. for rituals and the likes

- In order to meet your breeding objective;

  i. What are your trait preferences e.g. adaptation, productivity and reproductively

Adaptation

- Scavenging behavior, ability to fly (escape predators), resistance to diseases.

Productivity

- Number eggs per clutch, body weight, plumage color, Comb type

Reproductively

- Age at first maturity, age at first laying, nesting behavior, mothering behavior, brooding behavior, eggs hatchability

2. To compare the perception of communities on local versus improved chicken strains

- What do you choose to keep between local and improved chicken

- Give reason of your choice

  Local chicken ……

  Improved chicken ……..

- How do you compare the physical appearance between local and the improved?

  Local……

  Improved……

- Which one you prefer most? .....

3. What are the risks of continuous breeding of local chicken with exotic breeds?.....
4. Is there any impact of improved chicken strains to the population of local chicken?

   Yes/ No ( )

If Yes Explain …….

If No Explain ……..

5. How do you compare the products (eggs, meat, chicks etc) of local from improved chickens?
   a. Local……
   b. Improved……

CONSUMERS

- How do you compare the availability of local chicken with the improved?

  Local.....

  Improved.....

- What do you think is a major reason of variation of supply of the two?
- What can you say about prices for local and improved chicken? [give figures]
- Why are there variations?
- If prices are higher, can you afford that?

- How do you compare the palatability of eggs, meat from local and improved chickens?
- What do you prefer between local and improved chicken product and why?

TRADERS

- Where do you get chicken stocks for sale?
- And at what price per chicken
    - Local……..
    - Improved……..
- Which breeds are highly preferred by your consumers? And why?
- Where do you find them?
- How easy do you find the breeds?
- Which breeds of chicken do you prefer mostly for sale between local and improved chicken strains for your customers?
- Give reasons for your answer above……
- If your customers prefer local chicken what is their opinion?.....
- If your customers prefer improved chicken what is their opinion?.....
- Why your customers sometimes do not prefer the local chickens?.....
- Why your customers sometimes do not prefer the improved chickens?.....
- What will happen if the local chicken will no longer be found from the source?
    - What is your opinion……

- What constrains you always face in looking for stocks and why?

……