RURAL POULTRY IN TANZANIA; THE UNTAPPED POTENTIAL:A SHORT REVIEW

[1]Minga, U.M., [1]Yongolo, M.G.S., [2]Mtambo, M.M.A., [3]Mutayoba, S.K., [2]Lawrence, P. [3]Mwalusanya, N.A., [3]Katule, A. , [1]Gwakisa, P.S., [4] Mlozi, M.R.S. and [5]Olsen, J.E.
[1]Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, SUA, P.O. Box 3019, Morogoro; E-Mail: uminga@suanet.ac.tz,
[2]Department of Veterinary Medicine and Public Health, Faculty of Veterinary Medicine, SUA, P.O. Box 3021, Morogoro;
[3]Department of Animal Science and Production, Faculty of Agriculture, SUA, P.O. Box 3004, Morogoro;
[4]Department of Agricultural Education and Extension, Faculty of Agriculture, SUA, P.O. Box 3002 Morogoro,
[5]Department of Veterinary Microbiology, The Royal Veterinary and Agricultural University, Frederiksberg C, Denmark

ABSTRACT

This is a short review of the studies made on the scavenging local chicken (SLC) in Tanzania. According to recent estimates, there are approximately 28 million poultry in Tanzania and of these, 27 million are chickens, mainly scavenging local chickens (93.3%) and relatively few commercial broilers and layers (6.7%). The other poultry are Ducks and geese (743,500), turkeys (63,400) and Guinea fowl (38,000). Poultry are kept by about 2.5 million households out of 3.7 million agricultural households, compared to 1.0 million households which keep cattle. This large potential of the rural chicken is yet to be fully tapped. The main constraints to realising the potential are poor husbandry, low genetic potential and disease and, of the diseases, Newcastle disease has been singled out to be the most important. Due to those factors, the productivity indices are low and the off take rate is also low. Thus the average egg production per hen per year is about 70 whereas the average adult weight of hens is 1.54kg and for cocks is 1.85kg. However recent studies have revealed that the scavenging local chickens (SLC) differ phenotypically and that so far five ecotypes have been identified in Tanzania, namely ***Kuchi*** *(originating from Mwanza),* ***Singamagazi*** *(Tabora),* ***Mbeya*** *(Mbeya),* ***Morogoro medium*** *(Morogoro),* ***Ching'wekwe*** *or* ***Morogoro Short*** *(Morogoro). The ecotypes differ in their productivity indeces. The average adult body weights of cocks and hens of the ecotypes are 2.71kg and 1.83; 2.92 kg and 2.02 kg; 1.62 kg and 1.40 kg, 1.85 and 1.11 kg, 2.10 kg and 1.44 kg respectively. It is suggested that the economic and nutritional potential of the SLC can be fully realised if husbandry is improved, selective breeding is practised and diseases control through vaccination of especially Newcastle disease is regularly conducted. It is estimated that the chicken industry is worth 40.5 billion shillings or about US dollars 50.6 million and that with the ideal off-take rate, the industry can generate over 155.1 billion shillings or US dollars 193.9 million through the sale of about 103.4 million surplus growers alone. The way forward is proposed.*

INTRODUCTION

The livestock industry in Tanzania contributes about 18% to the gross domestic product (GDP) and 30% of agricultural GDP. About 70% of livestock GDP originates from cattle and 30% from other livestock including poultry which contributes about 16% (Melewas, 1989 and 1999).

The poultry industry in Tanzania is not well developed. Although chicken production on a commercial scale started in the 1960's, it has made minimal impact economically and nutritionally. The commercial sector has performed poorly because of the expensive and poor quality commercial feeds, diseases, veterinary expenses, unreliable supply of day old chicks and limited credit facilities. As a result, commercial chicken meat and eggs are expensive and consequently consumption is low. Under prevailing economic conditions, the scavenging local chicken (SLC) therefore appears to be a better alternative to the commercial chicken because it requires minimal inputs in terms of finance, manpower and land resources and hence the final product can be made affordably cheap.

However, the SLC has been neglected and limited efforts have been made by Government, NGOs and farmers to improve their health and productivity inspite of the potential it has. Improved health and productivity of the SLC would have a direct positive impact on farmer's income and nutrition. The purpose of this paper therefore to briefly review literature on SLC in Tanzania and highlight the potential of SLC in the country and the research and development efforts which have so far been made in Tanzania towards the improvement of the sector and propose the way forward.

PRODUCTIVITY INDICES OF THE *SLC* IN TANZANIA

The Potential

Population

Poultry number 28.3 million and of these 26.6 million (94%) are the scavenging local chickens (SLC), while 0.5 million (1.8%) are the commercial broilers and layers and the remaining 1.2 million (4.2%) are other poultry, mainly ducks (3.4%) (MOA, 1995).

About 72% of the rural households keep the 26.6 million chicken with an average of 10 chickens per household (Livestock census, 1994) although other and more recent studies have reported a higher figure of 23 chickens per household (Mwalusanya, 1998).

Productivity

The productivity indeces are relatively low among the SLC. In a study made at SUA in 1989 (Minga *et al*, 1986) and 1996 (Minga *et al*, 1996), it was reported that the average adult body weight was 1538g (range 800 - 2450g) and 1864g (1650 - 3800g) for hens and cocks respectively. The average egg weight was 41.8g with a range of 25 to 56g. The growth rate under scavenging system varied from 0.9g to 30.2g per day for chicks and growers and the rate differed depending on age and initial weight. Mwalusanya (1998) reported that the average growth rate from day old to 10 weeks of age was 4.6g and 5.4g per day for female and male chicks respectively. Hens laid an average of 40 eggs per year in three clutches. The average clutch size was 11.8 eggs, and hatchability ranged from 62 to 89% with an average of 83.6%. In a study by Mwalusanya (1998) it was reported that the mean cock to hen ratio was 1:4.3 In another study, Minga and others (1996) reported the ratio of chicks to growers to adults as 10:5:6, and that might explain the low off-take rate which is experienced in sector. The per capita consumption of poultry meat and eggs is 0.7 kg and 13 per annum respectively, while the world average is 6.8 kg of meat and 108 eggs.

Production cycle

In Tanzania, Tibamanya (1994) reported that the SLC takes 108 to 161 days to accomplish one production cycle thus:

Chicken Production cycle

Days	**Activity**
20	Laying 15 eggs per clutch
21	Incubating eggs before hatching
60 - 90	Brooding
7 - 30	Regaining

Therefore a total of 108-161 days are required to achieve three production cycles per year and produce a total of 45 eggs.

Ecotypes

Studies have shown that SLC are heterogenous as shown by their phenotypic characteristics (Lawrence, 1998). In Tanzania, Lawrence (1998) identified five ecotypes based on their geographical origin and phenotypic characteristics, thus: *Kuchi*, *Singamagazi*, *Ching'weke*, *Morogoro* medium and *Mbeya* ecotype. The ecotypes differ in several aspects, thus:

Kuchi from Mwanza region, has adult body weight of 2708g and 1827g for cocks and hens respictively, has an average body length of 25.2cm. The egg weight is 45g and shank length is 13.3cm.

Singamagazi from Shinyanga region with adult weight of 2915g and 2020g for cocks and hens respectively and has a body length of 26.4cm and 22.4 cm. The average egg weight is 45g. The shank length is 13.9cm and 10.9 cm.

Mbeya from Mbeya region has adult body weight of 1621g and 1394g for cocks and hens respectively. The ecotype has a body length of 23cm and 20.2cm for cocks and hens. The shank length is 12.4 cm and 10.2 cm. The average egg weight was 41g.

Morogoro Medium from Morogoro region has an adult body weight of 1850g and 1107g for coks and hens. Body length is 24.2 cm and 21.1cm and shank length is 12.0 cm and 9.7 cm. The egg weight is 38g.

Ching'weke (Morogoro short) from Morogoro region has an adult body weight of 2100 g and 1441.7 for cocks and hens. Body length is 23.3cm and shank length is 10 and 8.2 for cocks and hens. The average egg weight is 37.7g.

Disease resistance

In a study by Lawrence (1998), it was reported that immuno-competence as measured by production of anti-sheep red blood cells antibodies did not differ significantly between the

five ecotypes. There was no difference between the ecotypes in their susceptibility to Newcastle disease virus infection and *S. gallinarum* infection except for ***Kuch***i ecotype which survived *S. gallinarum* challenge. Serological blood typing using the Major Histocompatibility Complex (MHC) antigens which was conducted by Lawrence (1998) revealed that it was difficult to do MHC antigen typing of the ecotypes using serological methods which rely upon alloantisera originating from exotic commercial breeds. Lawrence (1998) tested 15 alloantisera with B-F and B-G specificities. Although it was shown that the BF 121 was the most frequent type, it was not specific for any particular ecotype. There were cross-reactions and some chickens could not be typed by using the 15 allontisera.

The Challenges

The big potential of the SLC has not been realised and utilised in Tanzania because of a number reasons. The major reasons are (a) chicken losses through various causes, (b) the low genetic potential, (c) low plane of nutrition and (d) poor husbandry system which is a low or near zero input extensive type (Minga et al, 1989 and Kitalyi, 1998). The low input, low output husbandry system is characterised by poor nutrition, poor or no housing facilities, non-selective breeding, no veterinary interventions and lack of provision for rearing chicks.

In an earlier study by Minga and others (1989) it was reported that the main cause of chicken loss among the SLC occurs during chickhood and averages 50%. The other losses of growers and adult chickens are due to other chicken diseases, predators and theft. Chicken loss during adulthood is mainly due to diseases especially Newcastle disease.

Loss due to disease outbreaks can be substantial. Whereas commercial chickens are regularly vaccinated against Newcastle disease (ND), the SLC are rarely if at all vaccinated against the disease. In Tanzania, ND has been singled out as the most devastating, whereby whole village populations may be decimated. In Tanzania, the greatest loss due to ND occurs during the hot and dry season starting from July up to the start short rains in October to November. However sporadic outbreaks do occur in between. (Yongolo, 1996) . The other infectious diseases which affect SLC in Tanzania include, collibacillosis, fowlpox, infectious coryza, fowl typhoid and Gumboro disease (IBD) (Minga et al, 1986). Parasitic diseases of importance are helmithoses and the ectoparasites, especially fleas and mites (Permin *et al*, 1997). In Tanzania, fowl typhoid is economically the most important disease affecting the commercial chicken industry and frequent outbreaks have been experienced in hatcheries as well as among the commercial layers (Minga and Nkini, 1986; Mdegela, 1998).

The availability of feeds for the SLC is irregular and varying in quality. During the rainy season, there is abundance of green vegetation, wild grass seeds and insects. Towards the end of the rainy season and beginning of the dry season when grains are harvested, there is abundant supply of grains and kitchen left overs. During the dry season however, grains supplys dwindle and insect population declines. There is very little feed supplementation. Rarely are the SLC fed on whole grains but rather spoilt grains and the brans which are left over after milling the grains. Such erratic feed supply cannot be expected to sustain high chicken productivity levels. It has been estimated that the SLC feed consumption provides to the chicken only 11 kcal ME and 11 g of protein per day and that amount of feed is inadequate for optimal productivity and below what is needed for maintenance (Kitalyi, 1998).

Mwalusanya (1998) reported that the main components of crop contents of SLC were cereal grains, bran, green for ages, insects and worms. The chemical composition of the crop contents were as follows: 43% Dry matter, 10% crude Protein, 5.8 crude fibre, 12.5% Ash, 0.66% calcium and 0.4 phosphorous.

RESEARCH ON SLC CONDUCTED IN TANZANIA

In Tanzania, limited research on poultry has been conducted on the SLC as follows:

1. Prevalence of diseases among SLC have been studied but mainly on Newcastle disease, Fowl typhoid and helminthoses. (Minga and Nkini, 1986; Yonglo, 1996; Permin *et al*, 1997).

2. Cross-breeding experiments have been conducted (Katule, 1989, Katule and Mgheni, 1990).

3. Studies on the use of various local feeds as carriers for the of HRV4 vaccine have been conducted (Foster *et al*, 1996).

4. The thermostability of the HRV4 vaccine at room temperature and efficacy have been studied Boya, 1997).

5. Studies on flock dynamics have been undertaken (Yongolo, 1998).

6. Nutritional studies have been undertaken (Mwalusanya, 1998).

7. Some ecotypes have been identified and disease resistance has been studied on a small scale (Lawrence, 1998).

8. Studies on productivity and nutritional status of the local chickens under village management conditions have been conducted (Mwalusanya, 1998).

9. The molecular epidemiology of fowl typhoid has been studied (Mdegela, 1998).

10. Studies on the molecular epidemiology of NDV are in an advanced stage (Yongolo, 2000).

11. Molecular typing of the SLC ecotypes in Tanzania is being undertaken and is in advanced stage (Msoffe, 2000).

12. A study to determine the value of the traditional medicinal plants in the treatment of chicken diseases is being undertaken (Waihenya, 2000).
13. HRV4 and I_2 vaccination extension packages have been tested and are continuing to be tested (Kapaga, personal communication, Buza, J.J., 2000).

THE WAY FORWARD

During the 1998/99 drought which affected some parts of Tanzania, it was realised that livestock can play a very important role as food security. Thus, livestock were sold to get cash to purchase food grains. Therefore, the SLC has the potential to contribute enormously to food security once the off take improves. It was stated by MacGregor and Abrams (1996) that 12 laying hens per household would reduce the incidence of malnutrition in the resource poor households.

The constraints experienced by the SLC sector must be solved in order to increase the production of the SLC. Once those constraints have been tackled, the chicken population will increase, off-take rate will increase which would be translated into better income and nutrition of the rural people. A moderate increase of off-take would easily be accommodated by the current level of the economy and will force prices down. Experience in Tanzania shows that the SLC meat are preferred to the commercial chicken meat on account of their perceived better taste and lack of residues especially hormones. There is thus a good market for the SLC in urban areas in Tanzania. Preliminary results of a market survey in Morogoro, Tanzania, indicates that there is a big market for SLC in urban areas.

A study has been conducted in Morogoro whereby, data on the number of scavenging local chickens transported to Dar es Salaam and Morogoro using the Dodoma highway is being collected at a traffic police check point near Morogoro town. Preliminary results show that for two months, (January and February) the numbers are substantial as shown below:

Number of chickens transported to Dar es Salaam and Morogoro during the months of January and February 2000:

Destination and month	**Average Number of transported per day**	
	January	**February**
Dar es Salaam	430	304
Morogoro	114	108
Total	544	412

Hence the expected Number of chickens to be transported for 12 months:
Dar es Salaam 367 x 365 = 133,955 chickens
Morogoro 111 x 365 = 40,515 chickens

Average Price per chicken in Dar es Salaam = 2,150/=
Therefore total sales in Dar es Salaam for one year will be = 288,003,250/= or US$ 360,004.00

Average price per chicken in Morogoro = 1,300/=
Therefore the estimated total sales per year in Morogoro = 1,300/= x 40,515
= 52,669,500/= or US$ 65,837.00
Therefore figures indicate that even when no intervention has been done to improve the health and productivity, the contribution of the SLC industry to the economy of the country is substantial.

The economic potential of the SLC in Tanzania through improvement of production; A model

The potential of the SLC in Tanzania may be gauged by using a simple model which is a based on an assumption that chicken loss is kept to a minimum, which is a difficult ideal to achieve but possible if major diseases are controlled.

It has been stated above that in Tanzania, the chick, grower, adult ratio is 10:5:6 which means, of the 26.6 chickens, there are 12.7 million chicks, 6.3 growers and 7.6 adults. Assuming a cock to hen ratio of 1:4 (Mwalusanya, 1998), the hen population is 6.08 million. If in an improvement programme chick loss is reduced to 10%, then after one year, there will be 11.43 million growers and assuming a grower loss and replacement will take 2% of the growers, the surplus will be 11.2014 million adults. The value of the surplus chickens will therefore be Tshs. 16,802,100,000/= or US$ 21,002,625.00. With sustained disease control efforts, the ratio of chick to grower to adult will be 37:29:1. This is based on the assumption that one hen would lay 45 eggs per year which will have hatchability of 83% the chick loss will be at 10%, egg consumption, and grower loss and replacement of parent adult chickens will be 2%. Hence the ratio will be 30:29:2 for chick, grower and adult chicken.

The total chicken population has been estimated to be 26.6 million and the figure was obtained by using a questionnaire and we have learnt through experience that farmers do not include chicks when giving population figures but rather count only growers and adults. On that assumption then, the adult population might be 13.3 (half of 26.6 million) and of these 4 in 5 would be hens and hence 10.88 million hens. By that argument, if disease is reduced to 10% and 2% chick and grower loss respectively, and ratio is 30:29:1 (chick:grower:adult), those hens would produce a progeny of 315.52 million adult chickens per year worth Tshs. 473,280,000,000/=, equivalent to US$ 591,600,000.00, equivalent to 4,930,000 herds of cattle. That ideal is unlikely to be achieved, but if it were to be achieved the domestic market would be unable to absorb it and alternative marketing strategies would have to be worked out. These figures are meant to emphasise the importance of the SLC that it could be a big industry especially where biologically farmed animals and their products are preferred.

One big constraint which would hinder the expansion of chicken population is feeds. Improved feeding regimes for SLC is constrained by shortage of the main ingredient in chicken feeds, viz food grains such as maize. As Sonaiya (1993) stated that, where there is no self-sufficiency in food grain production, there will be scarcity of alternative feedstufs for compound feed or other locally produced feeds.

In order to realise this big potential in Tanzania, it would require improvement in husbandry, nutrition and increased grain out-put and disease control strategies but with minimal financial input and such improvement must be made cost-effective and sustainable. Chick loss must be minimised through better husbandry practices and chickens be protected from the scourage of Newcastle disease. Husbandry practices which would minimise the rearing time for chicks would also greatly facilitate the quick build up of the chicken population.

Improvement of Genotype

The great variation in egg weights, growth rates, adult weight and the lack of MHC typability as well the presence of five ecotypes indicates that the SLC in Tanzania is phenotypically and genetically heregenous. The phenotypic and genetic heterogeneity and the indication of disease resistance emphasises the biodiversity of SLC and hence SLC are a rich source of genes ideal for selection, breeding and multiplication of the most suitable ecotype which would be most adapted to the local condition but with optimal productivity indeces. The

same was pointed out by Horst (1988) who stated that the genetic resource base of the indigenous chicken in the tropics is rich and should form the basis for genetic improvement and diversification to produce a breed adapted to the topics. The preservation of the indigenous chicken germplasm and biodiversity was advocated by Bessei, (1989).

Programmes aimed at improving the health and productivity of the SLC ought to be sustainable in order to have lasting impact on the income nutrition and health of target rural human population (Kitalyi 1998). Kitalyi (1998) recommended a step-wise improvement of the SLC production system, and which I would also like to advocate:

Step 1: Improve hygiene, shelter, preferrential treatment of chicks and control of devastating diseases and hence end up with healthy SLC.

Step 2: Improve management of SLC through supplementary feeding, better housing and disease control programme and formation of farmers group.

Step 3: Improve SLC productivity through selective breeding, for high yielding traits and for disease resistance. Improve feeding and marketing and formation of producer-consumer associations. Encourage vigorous promotion of the consumption of chicken meat, eggs and chicken products in urban and rural areas thus, increased consumption would create increased demand and thus sustain and promote improved chickens and increase SLC production. In turn it would add to food security, increased income and better nutrition and health for the resource poor rural populations.

Step 4: Commercial village chicken production system: Multiplication and distribution of high yielding SLC types. Promotion of Improved and competitive marketing strategies.

RESEARCH AND DEVELOPMENT FOR FUTURE

There are many areas of research which are unexplored or have inadequately explored with respect to the SLC:

1. Infectious and non-infectious diseases: Epidemiology and control
   Collection of baseline data, susceptibility trials, disease resistance testing of ecotypes, vaccination trials and treatments.

2. Husbandry:
   Production: Factors affecting production,
   Nutrition: Assessment of nutritional status of the SLC
   Feeding: Optimal feeding regimen using locally available feed ingredients
   Shelter: Development of appropriate shelter using local building materials

3. Population dynamics, Genetics (Genotyping), Breeding (Genetic improvement) and multiplication of improved ecotype/haplotype.

4. Socio-economics, including gender issues, land, time allocation,

5. Marketing: Optimal marketing strategies

6. Extension packages: Intervention technologies, development and application. Sensitisation and mobilisation

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