

Full Length Research Paper

A study of the management practices, challenges and prospect of low-cost poultry farming

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A study was conducted on 262 indigenous poultry farmers in Rwanda to assess the current status of low cost village poultry production. Majority of the respondents were male (59%) mainly (70.2%) located in urban and Per-urban areas. The majority (56.9%) had primary education and kept the dwarf type (53.5%) followed by the long legged type (26.9%). Stocking birds were mainly sourced from Neighbors (50.8%) and markets (30%). Free scavenging (67.4%) predominated. Disease management lagged as 41.4% farmers never treated birds and 37.2% used indigenous knowledge. Ectoparasitosis (35.2%) and Diarrhea (34.3%) were the main disease conditions cited. Only 15.7% of farmers reported disease outbreak to veterinarians. Clutch size ranged from 5 to 18 with mean of 13 ± 2 and hen maturity age averaged 7 ± 2.1 month. Farmers reported periodic high morbidity and mortality among poultry flocks with resultant low productivity and profitability. Predators (42%), diseases (23%), lack of credit (20%) were the main challenges stated.

Key words: Indigenous chicken, characterization, management, production, Rwanda.

INTRODUCTION

Rwanda is a small, hilly country located in East Africa and like other developing countries, it experiences situations of food insecurity, low household incomes and high prevalence of human and animal diseases. It also faces a challenge of limited availability of animal products; hence, it must increase its animal production base (Economic

Development Poverty Reduction Strategy¹ 2008). In Rwanda, livestock production is a major agricultural activity contributing about 8.8% of the national GDP (FAO, 2012). That is why the government of Rwanda has propounded a deliberate policy to increase meat production through encouragement of pig, poultry and the production of other small animal species (MINAGRI, 2012). The government of Rwanda has set the development vision 2020 (GoR, 2003) and the strategy for poverty reduction and economic development (EDPRS 2, 2013) in which agriculture, especially the livestock sector is one of the pillars of the national economy.

Poultry, particularly chicken are the most numerous and widely raised livestock species in the world (FAO, 2012). In Africa, almost every homestead keeps some poultry for mainly home consumption and cash sales (Dwinger and Unger, 2004). In most African countries, the rural chicken population accounts for more than 60% of the total national chicken population (Kitalyi, 1998). Village poultry production offers many advantages in poverty alleviation programs such as requiring less land, low inputs, and low startup capital (Saleque and Mustafa, 1996). Village poultry also contribute significantly to food security and poverty alleviation in disabled and disadvantaged groups in less favored areas in Africa (Wachira et al., 2010). Furthermore, village poultry are an appropriate means of promoting gender equality as estimated in rural areas of Sub-Saharan Africa, more than 70% of chicken owners were women (Guèye, 2000). Chicken can be reared in small place compared to other type of livestock and this is the situation in Rwanda where average acreage per household is less than a hectare with a high rate of population growth. In Rwanda the village poultry constitutes the majority of the national poultry flock but its role to food security and poverty eradication is often neglected (MINAGRI, 2012).

Poultry industry in Rwanda is characterized by the coexistence of 2 systems: rudimentary village poultry and industrial poultry at its infancy stage. The 2 systems are facing scarcity of inputs to fully exploit their potential (MINAGRI, 2012). The village chicken sector contributes to the 3000 tons of eggs and 2144 tons of chicken produced annually in Rwanda (FAOSTAT, 2014). Despite this contribution, this sector does not receive attention from many agricultural policy makers (including livestock specialists). Small-scale poultry farming in Rwanda and elsewhere is overlooked by many researchers, development and extension workers as an area of importance in terms of political significance or scientific prestige (Guèye, 2000). Little or no information exists on the profile of indigenous chicken in Rwanda to enable meaning full strategic planning of its development. Therefore a baseline study was conducted to characterize low cost poultry production, identify challenges and propose improvement in this sector.

MATERIALS AND METHODS

The study was carried out in all the 5 provinces of Rwanda (Eastern, Southern, Northern, Western and Kigali city) in the period 2014 to 2015, using a multistage sampling procedure and also based on the poultry population. In each province 50% of districts were selected except Kigali city where all district were selected and in each district 10% of the number of sectors were selected except Kigali city where three sectors /district were selected. This procedure resulted in a total of 48 sectors being included in the study. The report of the third Integrated Household Living Conditions Survey (NISR, EICV III 2012) conducted by Rwanda national institute of statistic indicates the total number of households in Rwanda at 2,492,642, of which 46% kept poultry

which are predominately village chicken the poultry keeping households were about 1,146,615.

The ultimate sample size was determined using Slovin's formula, $N' = N \times DE / [1 + N (e)^2]$ (Cochran, 1963), which was applied on the nation chicken population. Accordingly simple size of 210 households from 48 sectors was determined whereas 262 village chicken keeping households were final surveyed in the study. Within the sector village poultry, farmers were randomly selected using the snow ball sampling technique. Data were collected using Pre-tested semi structured questionnaires which were administered by previously trained enumerators in a period of three months, data were entered in SPSS version 16 for descriptive analysis to obtain results (totals, means, ranges, percentages, etc..) and presented as text, tables and figures.

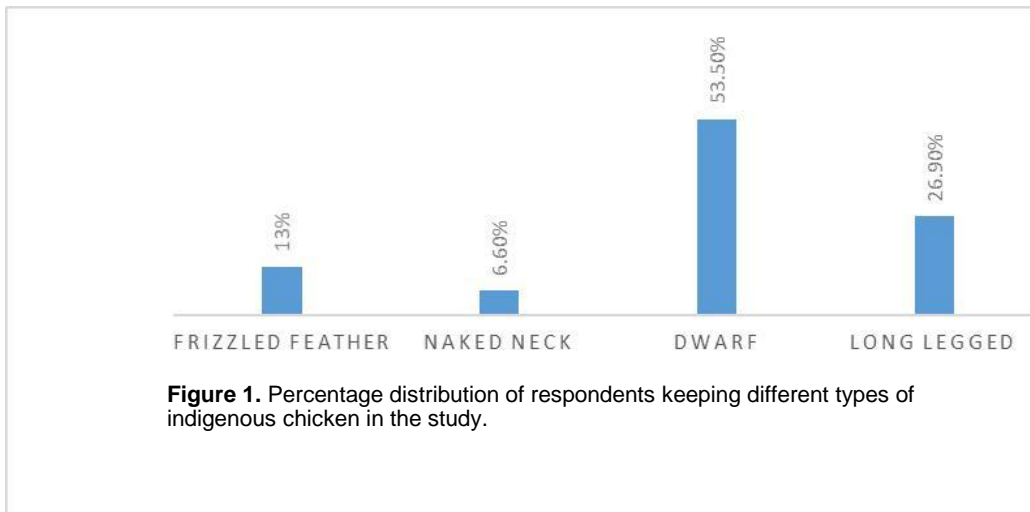
RESULTS AND DISCUSSION

Social economic characteristic

The study involved 262 respondents of whom 95 (36.6 %) were located in peri-urban, 88 (33.6%) were from urban centers and 79 (29.8%) were from rural areas. These results show that low cost poultry production is relatively well distributed in rural, urban and per-urban areas. This shows that improvement in village poultry production would benefit the livelihoods of rural as well as urban and per-urban dwellers. The average family size was 6 ± 2.2 people which is very close to the national average of 5 members/ household (NISR 2012). Overall, 65.2% of the respondents depended only on family labor while 19.3% used family and hired labor and 15.5% only used hired labor. These results show that indigenous poultry farming is not regarded as an economic activity requiring hired labor. The average age of respondents in this study was 35 ± 11.2 years ranging from 17 to 52 years which is in line with the fact that 39% of Rwandese are in their youthful (14 to 35) age range (ECIV 4, 2016). It also suggests that the youth are likely to benefit from any improvements in village poultry production.

With regard to the education level of respondents, the majority (56.9%) had attended primary school, while 24.8% had no formal education, 16% had attained secondary education and only 2.3% had attended tertiary education. The education level of respondents was higher in Kigali city where 21.6% of respondents had attended secondary education level followed by eastern and Northern provinces (13%). None of the respondents from southern and western provinces had attended secondary level of education. The low level of education among the respondents is in accordance to the fact that the majority of Rwandese (78.6%) has primary level of education (NISR, 2012), and therefore improved economic return from low cost poultry farming could go a long way to improve the education levels of the communities.

The results also revealed that house wives (44.5%) were the main caretakers responsible for management of chicken among the surveyed households while 25% were



reported to be the children, 17.2% husbands and 13.5% declared it was a responsibility of all family members. The family labor input into the rural poultry production system was a plurality but there is more time and labor demand for women than men. Chicken keeping is a domain of women but because of economic priorities, men have changed roles and attitudes towards the enterprise (Okitoi et al., 2007). The findings of this study are also in line with the observations of Bradley (1992) and (Fisseha et al, 2010) that the management of village chicken was highly associated with women for various historical and social factors. Various studies have also come up with the same observations that women and children were generally in charge of village chicken husbandry in developing countries (Riisea, 2004; Kitalyi, 1998; Aboubakar, 2013; Mekonnen and Egziabher 2007.

Flock structure, breeds and breeding

The majority of respondents kept only indigenous chicken (92.4%) and only (7.6%) kept exotics or improved breeds of indigenous chicken. Replacement of flock was done exclusively with their own birds. Traits such as body weight, growth rate, and number of eggs per clutch and tolerance / resistance to diseases were reported to be considered during selection of breeding stock. Among the respondents that kept indigenous chicken, the majority (53.5%) kept the local dwarf breeds followed by the long shank (26.9%) (Figure 1). The dwarf type was widely distributed in all regions especially western (87.4%) followed by Kigali city (62.7%) and Eastern (61.3%). However, the long shank type was most reported (68%) in the Northern Province. The dwarf type are small birds with poor production and growth parameters but may be preferred due to their high prolificacy, adaptability to harsh environmental and poor feeding conditions as well as resistance to diseases (Mahoro et al., 2016).

Indigenous chickens have large morphological variations. Overtimes, morphological variation was selected based on social cultures and beliefs of the

community. For example in Ethiopia, Those indigenous birds which have got red or white plumage colors combined with pea shaped comb-types always fetched higher price than their counterparts (Mammo, 2012). The diversified agro-ecologies in country maybe attributing to the presences of diversified phenotypic appearances of local chickens. This may create influences on the market values of chickens. Thus, any breeding and improved production program of the local chickens should therefore, incorporate the production objectives and trait preferences of the society for example in Niger, frizzling and naked neck genes was reported to confer better feed conversion, growth rate, feed efficiency and dressing percentage than the normal feathered chicken (Ajayi, 2010). Such gene pool should be protected from genetic erosion and apply for improvement through traditional selection together along with technologies of genomics (Mammo, 2012).

Therefore, the big gene pool resources in Rwanda should be well characterized and protected from genetic erosion and be used for improvement through traditional selections together with genomic technology. An improving program for indigenous chicken should include both the animal performance and traits preferred by the society

Average flock size

The flock size ranged between 2 to 18 birds per household leading to an average of 8 ± 7.2 and mode range was 5 to 6 birds'. Flock size per households was very small as most households (68.8%) kept less than 5 birds and only (5.8%) kept more than 10 birds. The results of this study differ from those reported in North West Ethiopia (Fisseha et al, 2010) where flock size of indigenous chickens was up to 57 birds. With such small flock size, it is very difficult to raise enough financial income from village chicken production. It is obvious that increasing flock size and its production per unit can go a long way to raise household incomes in rural Rwanda.



Figure 2. Indigenous chicken scavenging for feeds on free range system in Nyanza District (Source: During data collection).

Crossing breeding of local chicken with high performing improved/pure breed has been proven to have positive effects by increasing the overall meat and egg production (Pedersen and Kristensen 2002). However, only, 5.3% of the respondents reported to have adopted this technology. There by the vast number (94.7%) of households reared, local, less productive chickens. New born chicks, eggs and cocks of improved (synthetic genotypes suited for multipurpose production under the Kenyan environment is also available to the farming community). In Rwanda therefore, low cost poultry farmers especially women should be encouraged to rear improved village chicken types such as. Kuroiler, in large flocks. The use of protective chick confinement structures such as brooding baskets will be valuable in ensuring flock growth by reducing chick mortality.

Production systems

Free range with scavenging was only system identified with 47.7% of farmers that had separate night shelter for their chicken. The rests kept their chicken in other places such as the kitchen 1.5% kept the chicken under the granary, while 0.8% kept their poultry under the trees.

Feeding

With regard to feeding of indigenous chicken free scavenging (67.6%) was predominant with only a few 32.4% who supplemented the birds after scavenging. Free scavenging (Figure 2) is a low cost method of feeding but may predispose birds to diseases, worms,

pests and predators (Oakeley, 1998), it can also be associated with uncontrolled breeding, conflicts from straying in the field crops, and low growth rates characteristic of the low input poultry production system (Wang et al., 2009). This kind of production system has low production rates and it is one of the causes for the unsatisfactory performance observed. The chicken in an extensive free ranging system are a function of natural selection and as a result the performance of such chickens remains generally poor due to pronounced broodiness leading to low feed intake, slow growth rates, small body size and low production of meat and eggs (Kitalyi, 1998 and Sonaiya, 2000).

Source of breeding stocks

Most of respondents (50.8%) got their breeding stock (cocks) from neighbors (Table 1) followed by some purchasing from the local market (30%). This can be attributed to the lack of organized indigenous chicken breeding farms in Rwanda.

Farm management and record keeping

Record keeping was rarely practiced as only 7% of respondents kept records. Most farmers reported keeping production records (63%) followed by those who kept income and expenditure (36%). This shows how low input poultry farmer's encounter with difficulties in effective planning, monitoring and evaluating their activities. Among the reasons of not keeping records, about 60% of the respondents mentioned lack of awareness (ignorance)

Table 1. Source of stocking local breeds.

Source of stocking	No. respondents	Percent
Inheritance/ gift	44	16.8
Farmer's neighbours	133	50.8
Government	0	0.0
Non-government organizations (NGOs)	5	1.9
Local market	80	30.5
Total (N)	262	100.0

Table 2. Different methods of controlling chickens movements.

Parameters	No. respondents	Percent
Daily watching	15	7.4
Partial in-shelter confinement	108	52.6
Tethering	82	40
Total	205	100

as a reason, followed by 36% who cited no value added and the rest (4%) had no specific reason.

Restraint of chickens in cropping season

Partial confinement was reported to be used by 52.6% (Table 2) of respondents for restraining birds against straying. These results are indicative of trend of improvement towards intensification by adapting some form of poultry confinements. Partial in-shelter confinement was a common method of controlling chicken movement. Prevention of straying on field crop which was reported by the majority of respondents (64.5%) to be the main reason of controlling chicken movement in the cropping season followed by minimizing losses due to predation (38.5), and also to ensure harmonious neighborhood relations. Low cost poultry farmers in Rwanda should therefore be advised to use local available materials to construct appropriate confinements to reduce poultry straying and predation.

Housing

Various kinds of chicken housing were noticed. As 45.8% of the respondents reported sharing their domestic houses with their chicken, 47.7% reported possession of separate houses. This shows a good trend of evolution in providing shelter to chicken as well as caring for human health. In Ethiopia nearly all (97.6 %) of the respondents did not have a separate house for their chickens (Mekonnen and Egziabher 2007).

Animal health management and husbandry practices

A large number of respondents (98.1%) reported cleaning

of poultry shelters as a bio-security measure, 73.2% of them clean the shelters once a day while 22.2% clean twice a week. This shows a good tendency to improved animal health by ensuring animal hygiene and sanitation. The overall management of poultry health was reportedly still very low as 41.4% of the respondents left their sick chicken for self-cure and 37.2% used indigenous knowledge of treatment (traditional, vein piercing and defeathering). Modern approaches to poultry disease management were still very low as only 15.7% of respondents reportedly to consult veterinarians in case of outbreaks of poultry diseases. This may explain the often very high morbidity and mortality among indigenous poultry flocks and the resultants low productivity and profitability (Msoffe et al., 2010).

The use of poultry and their products

The results on use of poultry and their products were indicative of a reasonable shift from subsistence to commercial production as 75.2% of the respondents reported selling their chickens and eggs nearby or at local market to raise household income or resolve other family problems. This result is in agreement with other researchers who while working in Ethiopia concluded that selling of live birds for income generation was the primary goal of keeping low input poultry in developing countries (Sonaiya, 2006).

Production parameters

The production parameters derived from the study population were characteristic of a system with very low production and productivity. The average flock size was 8

birds per household, clutch size varied between 5 to 18 eggs with an average of 12 eggs per cycle. Chick's mortality was very high with average chicks surviving/hen/ batch to be four and growth rate was also reportedly low as age at maturity was cited to be 7 months for female birds and 6 for cockerels. This was similar to the situation in southern Ethiopia where average clutch size was 14 eggs and duration to first egg was 6 months (Mekonnen and Egziabher 2007). In similar study in Bure district, North West Ethiopia, the average age of cockerels at first mating and pullets at first egg were 24.6 weeks and 27.5 weeks, respectively. The average number of eggs laid/clutch was 16 (ranged 8 to 28) and the number of total clutch periods/hen/year was 4 (ranged 2 to 6). The annual egg production performance of local hens, under farmer's management condition, was 60 eggs/hen (ranged 24 to 112). (Moges et al., 2010)

Reported challenges

Predators were reported (32%) to be the main challenge followed by ectoparasite and enteric diseases (23%). These finding is similar to that of (Halima et al., 2007) working in North-western Ethiopia also reported. It is noteworthy that the majority of respondents (76.1%) reported poultry confinement as the method used to prevent predation. Others use trap nets (11.2%) and scarecrows (4.2%) while others do nothing. Other challenges included poor access to credit (20%), lack of veterinary services (14%) and quality breeding materials (11%).

In southern Ethiopia, critical constraints of the smallholder poultry production in the study area were partly due to the prevailing poor management practices, in particular predation, lack of proper health care, and poor housing (Mekonnen and Egziabher 2007). Efforts of low cost poultry farmers in Rwanda should therefore be consolidated into cooperatives for easy access to services (technologies, credit, inputs etc.) thereby easing most of the prevailing challenges. Special attention should be given to sourcing of genuine improved genotypes through farmer cooperatives.

CONCLUSION

The indigenous chicken of various types were the most common (53.5%) and all the bird types had low production parameters: an average clutch size of 12 eggs, 3 cycles per year and late maturity age. Designated houses for night poultry confinement were still rare (48%). Birds were not confined during the day, and free scavenging (67.4%) prevailed. Ecto parasite and diarrhea were common. A larger number of farmers 41% did not treat sick birds whereas 37% of respondents used traditional treatments, leading to high mortality and reduced productivity.

It is therefore evident that low cost poultry production in Rwanda is characterized by small flocks, a low levels of production, lack of breeding schemes, lack of genetically selected breeding birds, lack of treatment, lack of facilities and information among others. With the reported small flock sizes it is difficult for local poultry production to make adequate income. Housewives were the major responsible for poultry production. Based on all the findings, low cost poultry production in Rwanda still lacks attention to achieve their potential in helping poor families with an income and food source."

Conflict of Interests

The author has not declared any conflict of interests.

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