Indigenous chicken flocks of Eastern Uganda: I. Productivity, management and strategies for better performance

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Abstract

A study was conducted to determine the productivity and management of indigenous chickens of Kumi district in Eastern Uganda. Eighty households were randomly selected to respond to a standard questionnaire.

The average flock size per household was three cocks, six hens and four chicks. Sexual maturity is attained at 5.5 and 6.5 months among male and female chickens respectively, with age at first egg ranging between 5.5-7 months. Egg hatchability varied widely between farmers with an overall mean of 90%. Clutch sizes ranged between 4-19 eggs per clutch, with a mean of 13 eggs. Chickens were acquired through purchase (65.6%), gifts (26.3%), or in exchange for labour. Scavenging was the major feeding system, seasonally supplemented with cereal grain. The majority of the farmers (87.5%) provided birds with drinking water. Death of chicks was prevalent (73%) and was mainly attributed to Newcastle disease (70%), with most of the mortality being observed during the dry season (62%). Survival of chickens was significantly affected ($P<0.001$) by feeding level, and strongly correlated (r = 0.83) with the housing system. Housing and feeding had significant effects on duration between laying cycles ($P<0.001$), how chickens were acquired ($P<0.01$), and the uses to which the chickens were put ($P<0.001$). Chickens and eggs are mainly used to generate household income and for home consumption. In some households, chickens are exchanged for goats and subsequently, for cattle.

Our findings indicate that the indigenous chicken is a major resource in Teso, Uganda. The performance of these indigenous chickens would significantly improve with better feeding, housing and health management. Chicken farmers should be empowered through training and provision of capital credit, the latter of which should be well informed by data on the chicken production cycle.

Key words: Scavenging, eggs, feeding, health households, nutrition, rural

Introduction

The poultry industry in Uganda is composed of 21.8 million birds (MAAIF 1998) and estimated to consist mainly of chicken comprising of 10 million birds. Over 90% of Ugandan chickens are indigenous stock reared under the Backyard system (Olaboro 1990), producing an average of 50 eggs per hen per year. The eggs are either for hatching chicks or used as table eggs. The other 10% consist of improved exotic commercial layers and broilers kept under the intensive system of husbandry mainly in urban areas. Intensively managed commercial enterprises comprise of small units of between 50 and 500 birds, the medium sized units of 500-1,000 birds; and few less than 5% of the large scale units of over 1,000 birds (Nsubuga 1985; Olaboro 1990). The village flocks consist of unimproved local chickens, typically 5-20 birds per family (Okot 1990). A part from chickens, other species of birds kept in rural areas include turkeys, ducks and guinea fowls and pigeons.

Little is known about chicken production of Teso in Eastern Uganda, yet the region is the biggest producer of local chickens in Uganda. Much of the chicken production has been based on traditional knowledge and

to some extent, on literature mostly applicable to temperate regions (Oba 2000). The most common structure of the chicken industry in Kumi district is composed of village flocks, which are un-improved and are kept for subsistence (Nsubuga 1985). The cost of production of these birds is low, mainly because they feed on household scrap, kitchen refuse and free range findings (scavenging), though their productivity is generally low. Similar observations have been made on free-range chicken in studies elsewhere (Mopate and Lony 1999; Muchadeyi et al 2005; Aboe et al 2006).

Goromela and colleagues (2007) showed that the nutrient concentrations of scavengeable feed resources consumed by rural poultry are below recommended levels for optimum growth and egg production. Understanding the performance of indigenous poultry is vital to enable planning and informing policy on conservation and sustainable utilisation of these resources, especially among resource poor households.

Materials and methods

Study area

A survey was conducted in the Kobwin and Kumi sub-counties of Kumi district in Eastern Uganda, the region that is very popular with indigenous chickens. The study area has a total human population of 47,478 people on a 19 sq. Km. land area located in the Teso farming system.

Sampling procedure

Two sub-counties with a high density of indigenous chickens were purposively selected in Kumi district. Two parishes were randomly sampled per sub-county, from each of which four villages were surveyed (Table 1). Five homes distant from each other were chosen randomly per village. This sampling frame resulted into eighty households engaged in the entire study.

Table 1. The number and proportions of households by administrative area and gender

Variable	Level	Number (%)
Sub-County	Kobwin	40 (50)
	Kumi	40 (50)
Parish	Aciisa	20 (25)
	Agule	20 (25)
	Atoot	20 (25)
	Omatenga	20 (25)
Gender of respondent	Male	73 (91.2)
	Female	7 (8.8)

Data collection and analysis

Quantitative primary data was collected in 2005 from farmers using a standard questionnaire. Data was then coded and analysed using Statistical Analysis Systems software (SAS 2001). Descriptive statistics were used to obtain frequencies and percentages. Pearson correlation coefficient was determined between respective parameters.

Results and discussion

Household characteristics

Households were largely male headed (91.2%), and almost all household heads (87%) attained some form of formal education. From Figure 1, it is evident that proportionately, more men had attained more education than women.

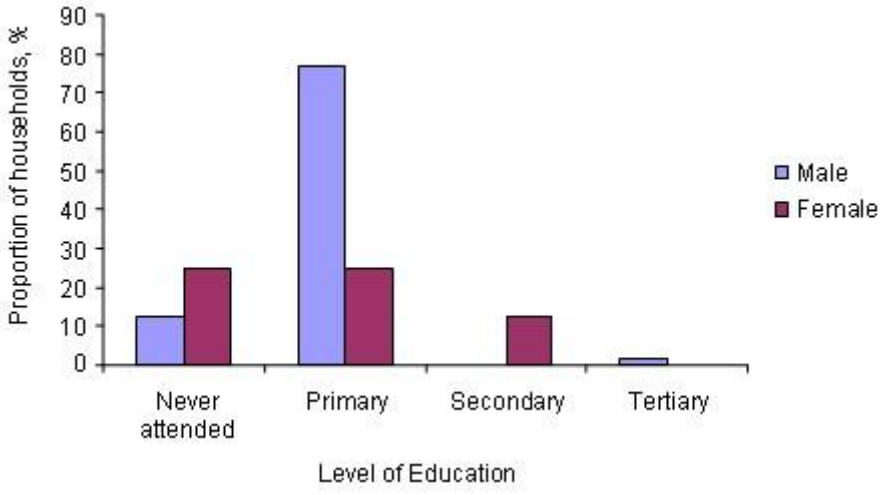

Figure 1. Level of education of household heads by gender

These results generally agree with Owoyesigire (2002) who reported slightly lower values for the two parameters. Low levels of education observed in this study may explain the reliance on indigenous knowledge for management by poultry keepers. Education level had a weak but positive correlation (r = 0.37) with durability of poultry housing, implying that more educated persons were more likely to invest in better housing than others would. Labour for management is provided by all household members, but unlike in other areas (e.g. Aboe et al 2006), men play a bigger role in poultry management because in the study area, poultry is the main economic enterprise.

Mode of acquiring chickens

In most of the households, chickens were acquired through a combination of two or more of the following ways: purchased (65.6%), given as a gift (26.3%) or exchanged for labour (8.1%). The latter two non-monetary transactions involving the local chickens show the socio-cultural role of the chicken in the Teso communities. Greater economic gains could be realised from chicken units if the proportion of gifts and slaughter for visitors reduce, thereby providing a positive feedback on management provided.

Chicken flock size and performance

Over 95% of households kept up to 5 cocks, while majority of the households (46%) kept between six and ten hens (Table 2). These numbers are within the 5–40 flock size range reported for Uganda flocks (Kyarisiima et al 2004), and flocks elsewhere (Mwalusanya et al 2001; Muchadeyi et al 2004).

Table 2. Flock size of indigenous chickens by sex

Sex of chicken	Number of chickens in flock	Percentage of households, n = 80
Male	0 – 5	96.1
	6 – 10	3.9
Female	0 – 5	40.5
	6 – 10	45.6
	11 – 15	11.4
	16 – 20	2.5

The numbers were generally low because of mortalities in the dry season period preceding the study, along with slow growth rates, poor egg production and susceptibility to diseases by the chickens. Foster et al (1997) observed extremely high mortalities due to Newcastle disease in Tanzania as a major factor that discourages peasants from investing much of their time and scarce resources in expanding flock sizes. It's also plausible that the practice of exchanging chickens for goats is responsible for the low flock sizes observed in some households.

This study found that sexual maturity is attained at 5-6 months for male and 6-7 months for female chickens respectively. The age at first egg ranged between 5.5-7.0 months, while the length between two laying

cycles was 2-3 months giving 3-4 clutches per year. These findings generally agree with those on indigenous chickens in Uganda (Kwapil et al 1992). Aboe and colleagues (2006) also reported 3-4 clutches per year in Ghana, while Kyarisiima et al (2004) gave an average for Uganda of 2.5-3.0 clutches.

Clutch sizes ranged between 4-19 eggs per clutch, with a mean of 13 eggs. The clutch size was close to 6-20 eggs for indigenous Uganda chicken (Kyarisiima et al 2004) and 10-20 eggs (Aboe et al 2006). However, this projects to 40 eggs per year, much lower than 300 eggs produced by exotic chickens under tropical conditions (Katule 1990; Gunaratne et al 1993). Egg production could nevertheless be increased by reducing the laying cycle by restricting prolific birds from brooding and incubating their own eggs.

Egg hatchability in this study varied widely between farmers with majority reporting 90%, much higher than earlier reports (40-100) (Kyarisiima et al 2004), and 75% (Aboe et al 2006). The average number of chicks weaned ranged between 7 and 15 per hen compares well with that of indigenous chickens in other developing countries (Sonaiya 1990). This level of performance is principally attributed to pre-weaning mortality.

Mortality levels of the chickens and the its causes

Mortality affects the sustainability and productivity of the local chicken enterprises. Chicks died on most farms (73.2%) mainly due to Newcastle disease (70%) according to the farmers' knowledge, not laboratory diagnosis. This was followed by mature birds (15.5%) while pullets and cockerels died least (11.3%). Mortality was attributed to diseases and wild animals by 77% and 23% of the respondents respectively (Table 3).

Table 3. Chicken age-group with most mortality, causes and effect of season

Variable	Level	Number (%)
Age group with highest mortality	Chicks	59 (73.7)
	Pullets and cockerels	9 (11.3)
	Mature chickens	12 (15.0)
Causes of mortality	Diseases	62 (77.5)
	Wild animals	18 (22.5)
Season of most mortality	Wet season	31 (38.7)
	Dry season	49 (61.3)

Majority of the farmers (61.8%) reported that diseases mainly strike during the dry season, showing the positive relationship between Newcastle prevalence and low humidity. The wild animals that decimate the chickens include foxes, wild cats, eagles and kites. Wild animals that attack birds at night could be controlled by providing night shelter. The prevalence of mortality per age category was nevertheless relatively lower than studies elsewhere.

Related studies indicate severity of Newcastle disease during the rainy season in Kenya (Anonymous 1990) and Ethiopia (Sonaiya 1999), while in West and Central Africa; major outbreaks are seen during the dry season (Mukiibi-Muka 1992; Gueye 1998). Mortality in the rearing of chicks represented eggs hatched which could have been eaten or sold for household income. It also shows laying time lost while the hens incubated eggs and reared the lost batch of chicks. While predators were also blamed for the losses of chickens, the very low growth rates of the chicks and the low protein diet probably mean that malnutrition and associated weaknesses are major causes of losses both directly and indirectly by increasing vulnerability to predation.

Most of the birds are sold in the dry season and this coincides with the high Newcastle incidence, increasing the spread of the disease. However, it is also prudent on the side of the farmers to sell at this time since; the risk of total loss is very high. New castle could nevertheless be overcome, using thermo-stable vaccines.

Feeding of chickens and provision of water

Feeding level significantly ($P < 0.001$) affected survival of chickens, with chicks having the highest mortality. This could be because chicks do not get a balanced diet required for survival. Imbalances in nutrients lead to stunted growth rendering the chicks susceptible to disease attack. The cause of death positively correlated (r = 0.83) with feeding level and housing system. Poorly fed birds may have had low immunity to diseases and also housed chickens would be expected to survive predator attacks during the night.

The chickens are reared in a free-range system, predominantly scavenging with only 32% of the farmers providing some supplementation. Maize, sorghum, millet and other grains are provided as supplement. However, this is seasonal in most households, being practiced only during the harvesting season. Both scavenging and hand feeding of indigenous poultry still predominate in other countries including Ethiopia, Gambia, Tanzania and Zimbabwe (Kitalyi 1995). Most of the farmers (73%) who supplement just pour the feed on the ground while the rest use containers similar to those used for water. About 88% of the respondents provide water to their indigenous chickens using pots, plastic and metallic containers. Farmers who do not provide water claimed they rely on rainwater puddles and dew.

Housing management

Results show that 77% of respondents kept chickens in complete enclosures (Table 4) such as owner's residential hut, kitchen or night ark. About 20% of the households let their chickens perch in trees overnight.

Table 4. Type of feed, mode of feeding and provision of water and housing to chickens

Variable	Level	No. of households (%)
Type of feed	Scavenging only	40 (51.6)
	Scavenging and supplements	39 (49.4)
Mode of providing supplements	Use containers	11 (28.2)
	Feed poured on ground	28 (71.8)
Water provision	Provided	70 (88.6)
	Not provided	9 (11.4)
Type of housing	Complete enclosure	76 (95.0)
	Perch in trees	4 (5.0)

Swatson et al (2001) reported that only 7% of farmers provide chickens with overnight accommodation in Natal, South Africa, a clear deviation from results of this study. Provision of accommodation and hence overnight security indicates the importance that farmers attach to their flocks, because farmers who kept chickens as an economic enterprise did provide it. Management regime of the flocks was strongly correlated with reproductive performance.

Housing and feeding had significant effects on duration between two laying cycles ($P < 0.001$), how to acquire chickens ($P < 0.01$), the uses to which the chickens were put ($P < 0.001$), and cause of chicken mortality ($P < 0.001$). Provision of housing and supplemental feeding improved the egg clutch size and shortened the cycle duration. This could be attributed to the birds which are not housed taking long to adapt to laying in indoor nests and occasionally laying in the bushes. Farmers are more likely to purchase chickens if some housing will be provided, and vice versa. Chickens raised under supplementation and housing was mainly for sale, while those managed in other systems were mainly for home consumption. The low correlation (r = 0.25) between housing and flock size does not render an easy explanation.

Poultry, products and their utilisation

The size of eggs laid by Teso chickens varied from small, medium to large. Of the 182 hens that were randomly selected in the study, 53.3% had medium sized eggs, 28% and 18.7% had large and small sizes respectively. Egg shells were white (39.8%), light brown (46.4%) or dark brown (13.8%). Chickens and eggs had two major uses, namely, sale to generate household income and local consumption, observed in all

the households surveyed. Local consumption included eating chicken products within the home, food for visitors, gifts to friends and the church. Chickens also are exchanged for labour and other livestock such as goats. A few of the farmers indicated that chickens are sometimes used for cultural functions and rituals.

Conclusions

- Indigenous chickens in Eastern Uganda generally live as scavengers, but in some households they are supplemented using cereal grain. Inadequate nutrition, housing and disease management have the biggest impact on productive and reproductive performance.

- Most chickens in the study area are kept for subsistence, with flock sizes ranging between 1-20 chickens per household.

- Chickens have multipurpose functions in the village economy, and for the traditional capital system in which they play a central role as a basis for building up stocks of goats, which are eventually bartered or sold off to acquire cattle.

Recommendations

We therefore recommend that local extension services be strengthened, and emphasis put on vaccination of chicks, formulation of low-cost feed resources, and design of low-cost housing. A major strategy would be to empower the owners through training and provision of a chicken farmers' tailor-made credit facility, which is informed by data on the chicken production cycle and the major bottlenecks along it. Further studies to manipulate the laying cycle to increase the number of clutches per hen per year should be done.

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