

On-farm characterization of indigenous chickens in Uganda

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1 SUMMARY

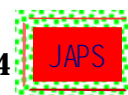
A study was undertaken to characterize indigenous chickens in Uganda in terms of the environment they live in, management, flock structures, uses, performance and phenotypes. Data were captured using a structured questionnaire administered to 240 respondents and involved 960 indigenous chickens. Data were analyzed by descriptive statistical methods, having been collated as absolute figures or percentages. Chicken flocks ranged from 2 to 113 and most people kept 1-4 cocks and 2-19 hens. The growers (3-7 months) formed the biggest (38%) part of the flocks followed by chicks (37%). Indigenous eggs are mainly used for hatching chicks (45%), eaten at home (33%), sold for cash (20%) and about 2% are used for other purposes. The chickens are kept mainly for home consumption (36%), cash (33%), ceremonies (16%) and gifts (13%). The chickens are valued mainly for their ability to scavenge (32%), followed by disease tolerance (29%), meat quality (22%) and general hardiness (17%). Adult cocks weigh 2.1kg compared to 1.4kg for adult hens. Most pullets reach sexual maturity at 7 months and most hens lay 14 eggs per hen per clutch, with a hatchability of 87% and wean 6.3 chicks on average after 2.8 months. On average, the chickens have two clutches of eggs per year and with an interval of 2.8 months between the two clutches. Throughout the country, the chickens exhibited a wide phenotypic variability in all the characters studied except egg yolk colour, which was exclusively 100% yellow in all districts. The wide variation in populations of indigenous chickens in Uganda may help to create improved breeds of chickens selected from the indigenous populations or crosses generated for specific purposes.

2 INTRODUCTION

Currently, the population of chickens in Uganda is composed of exotic commercial birds and indigenous free-range chickens. The population of rural indigenous chickens in the country has been estimated at 23 million or 80% of the national flock (MAAIF, 2006). Indigenous chickens are kept for meat, eggs, income and social-cultural roles. Despite efforts to introduce exotic chickens into Uganda, local chickens are still selling well in

urban areas and demand for them exceeds supply. Indigenous chickens are preferred because of their pigmentation, organoleptic qualities (taste and flavour), leanness and suitability for special dishes (Ssewanyana *et al.*, 2001).

In spite of their importance, the free-range indigenous chickens have been neglected in areas of scientific research on characterization, true performance potential,



and breed improvement. Compared to other sectors, much less has been done to improve the management and breeding systems of indigenous chickens (Ssewanyana *et al.*, 2001). This study was undertaken to characterize the

indigenous chickens in terms of the physical environment they live in, production potential, management systems, flock structure, main uses, performance and phenotype.

3 MATERIALS AND METHODS

A survey on indigenous chickens was conducted in the six districts of Soroti, Mbale, Jinja, Masaka, Sembabule and Mbarara using a structured questionnaire. The questionnaire captured information on the physical environment, the production environment, the management system, flock structures, main uses, performance and phenotypic characteristics. A representative transect across a cluster area was selected in which farmers were randomly sampled. Farmers were interviewed individually, questions asked in the local dialect and other observations were recorded. The total sample involved 960 chickens in 240 households.

The sampling frame was two sub-counties per district, two villages per sub-county and ten households per village. In each household, four chickens were phenotypically described, one of which was a cock. In any single household chickens with unique phenotypes, e.g naked neck, crest, feathered shanks, etc were targeted.

All data regarding flock size and composition, main uses of eggs and chickens, productive and reproductive performance and individual phenotypes were analyzed using descriptive statistical methods.

4 RESULTS

The size of chicken flocks ranged from 2 to 113 with a cock to hen ratio averaging 1:5 (Table 1). Most households had more female than male growers and in all the districts, growers and chicks formed the biggest part of the flocks.

cash (20%) and a few (2%) are used for other purposes. The chickens are kept for consumption at home (36%), cash (33%), ceremonies (16%), gifts (13% and a few (2%) for other purposes. The indigenous chickens are valued mainly for their ability to scavenge (32%), disease tolerance (29%), good meat quality (22%) and general hardiness (17%) (Table 2).

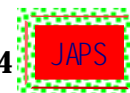
Uses of eggs from the indigenous chickens include hatching chicks (45%) to get replacement stocks, eating at home (33%), sold for

Table 1: Flock structures of indigenous chickens in Uganda.

Flock size and composition	Soroti	Mbale	Jinja	Masaka	Sembabule	Mbarara
Chickens in each household	7-49	6-103	2-113	3-85	5-48	15-26
Adults cocks	1-3	1-4	1-4	1-5	1-4	1-4
Adult hens	2-11	2-26	1-29	2-30	2-10	3-11
Number of male growers (3-7 months)	1-7	1-24	1-12	1-40	1-13	2-6
Number of female growers (3-7 mth)	1-15	1-40	1-18	1-40	1-17	8-10
Chicks (day 1-3 months)	6-24	2-50	3-72	1-40	2-18	4-11

The results on a range of performance characteristics recorded across the country are summarized in Table 3. On average, adult cocks weigh more than adult hens (2.1 kg vs 1.4 kg). Most pullets reach sexual maturity around 7 months of age and most hens lay an average of 14 eggs per hen per clutch. In all the districts studied, hatchability was above 80%, being highest at 90.9%

in Sembabule district. Most hens produced 2.2 clutches of eggs per year and the inter-clutch interval averaged 2.7 months. Hatch to weaning period lasted an average of 2.8 months and hens weaned 6.3 chicks yearly. Most hens in the country can lay eggs at any time of the year, but the peak laying period is between January and July.

**Table 2:** Farmers responses (%) to main uses of eggs, chicken and special attributes

	Soroti	Mbale	Jinja	Masaka	Sembabule	Mbarara	Overall
Use and attributes (%)							
Eggs							
Food	19	30	33	29	46	38	33
Cash	8	22	22	17	23	28	20
Chicks	73	43	43	50	31	31	45
Others	-	5	2	4	-	32	
Chickens							
Food	38	32	35	42	34	34	36
Cash	28	33	35	28	41	30	33
Gifts	15	14	12	16	7	14	13
Ceremonies	16	15	15	12	16	21	16
Others	3	6	3	2	2	1	2
Special attributes							
Disease tolerance	29	27	32	28	25	30	29
Meat quality (aroma)	27	16	21	24	18	25	22
Ability to scavenge	37	30	22	30	46	25	32
General hardiness	7	27	25	18	11	20	17

Throughout the country, the chickens were characterized by a wide phenotypic variability in all characters studied except the egg yolk colour which was 100% yellow in all districts (data not shown). Most chickens had mixed colours in their plumage (36%), followed by the black plumage (22%), brown red (18%) and white (16%). A few of the chickens had grey (3%), gold (3%) and red plumage (2%). Feathering did not have a well defined pattern in the majority of chickens sampled (40%). Of the patterns that could be described, pied pattern was most prevalent (18%) followed by barred (16%) and cuckoo (13%). Chickens with feathers all over the body (normal) were the majority (75%), followed by those with crests (12%), naked neck (9%) and feathered shanks (4%).

Four types of shanks were most frequently encountered, i.e. yellow (42%), black (21%), white (20%) and grey (16.5%). Green shanks were found only in Mbarara district and their prevalence was very small (0.5%). The eyes were predominantly orange in colour (61%) followed by red (17%), brown (14%) and black (8%). The earlobes were mainly white (48%), red (47%), a few yellow (5%) and most were not prominent (64%).

Multiple comb was the most frequent (78%) and the majority were bright red (55%). All the cocks sampled had combs, while 5% of hens did not have combs. Most chickens had a white skin (53%) followed by yellow skin (45%), and a few (1%) chickens had black and another 1% had reddish skins. The majority of chickens had medium body size (62%) followed by the small body size (25.0%). Some chickens (13%) were classified as large-bodied (>2.0 kg) and these were mainly cocks.

Most hens laid medium-sized eggs (56%, 37-40 mm at the largest circumference), followed by the small-sized eggs (32%; 30-36 mm at the largest circumference) and large-sized eggs (12%; more than 40 mm at the largest circumference). Most hens laid light brown eggs (48%) followed by the white-colored ones (47%) and dark brown (5%). In all the districts, the majority of chickens had wattles (82%), most of which were rudimentary (64%). The prominent ones were mainly found in cocks (35%). Seventy two percent of the sampled chickens had rudimentary spurs and these were mainly hens. Only cocks had large spurs (5%). Indigenous chickens in Uganda have mainly straight tails (46%), followed by those with arched (32%) and sickled (22%) tails.

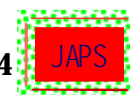


Table 3: Performance characterization of indigenous chickens in Uganda.

Measurements	Soroti	Mbale	Jinja	Masaka	Sembabule	Mbarara	Overall Means
Av. weight of adult cocks (kg.)	1.8	1.9	2.4	2.4	2.3	1.7	2.1
Av. weight of adult hens (kg.)	1.3	1.3	1.6	1.5	1.5	1.2	1.4
Age at first egg (months)	7.4	6.2	7.2	9.0	6.8	7.6	7.3
Egg production / hen / clutch	13.0	14.0	15.0	14.5	13.0	14.8	14.1
Hatchability (%)	89.3	87.9	82.6	89.7	90.9	82.3	87.1
Number of clutches per year	2.3	2.4	2.3	2.2	2.1	2.0	2.2
Clutch Interval (months)	2.0	2.0	2.7	3.2	2.8	3.5	2.7
Hatch-weaning period ¹ (months)	3.0	3.1	2.1	2.8	2.7	3.4	2.8
Average number of chicks weaned	6.1	5.9	6.6	7.4	7.6	4.0	6.3
Seasonality of egg laying	Jul-Aug	Jun-Oct.	Jul-Sep	Jan-Jul	Jan-Jul	Apr-Jul	

¹Indication of mothering ability

5 DISCUSSION

Scientific reports of investigations on indigenous chickens in Uganda are scarce and this study was the first of its kind in the country. The results obtained in this study indicate that indigenous chickens in Uganda have fairly similar flock structures and performance characteristics as those encountered elsewhere in Africa (Dipeolu *et al.*, 1996; Sonaiya, 2001). The big range (2-113) of the total number of chickens indicates that interventions to improve the indigenous chicken in Uganda would have a big variation and impact on individual households. Most households keep more female than male growers, which is understandable since they need to regularly replace breeding stocks. Mbale and Masaka districts had more growers and chicks than the other districts, which is a reflection of better management practices. Farmers in Masaka dye their chicks to protect them against predators, which helps to increase the flock sizes.

The observation that farmers use eggs mainly for getting chicks would imply that in the long run farmers perceive sale of live birds to be more profitable than selling eggs. The indigenous chickens in Uganda are highly rated by their owners for their ability to scavenge and their tolerance to diseases. These are two important attributes that may be exploited during the development of improved lines from the local populations.

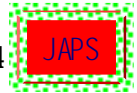
The findings of this study generally agree well with studies in other parts of Africa (Dipeolu *et al.*, 1996; Sonaiya, 2001). The number of chicks (6.3) weaned in the country is low compared to the high hatchability recorded in the districts, which indicates that mortality from hatching to weaning is quite high. Ssewanyana *et al.* (2001) observed a mortality rate of 32.3 and 25.0% in Apach and Kumi districts of Uganda, respectively, mainly due

to New Castle Disease. The hatch-to-weaning period lasted an average of 2.8 months, reflecting that indigenous hens rear their chicks for quite some time and are, therefore, generally good mothers.

Uganda is located along the equator, allowing an almost equal distribution of day lengths throughout the year. In spite of this, it was observed that most hens laid most eggs between January and July, which means that circadian rhythms of laying hens respond more during the months of longer days than during months of shorter days.

Some studies that have attempted to characterize African chickens include those of Agbede *et al.* (1995) in Cameroon, Ndegwa *et al.* (1999) in Kenya and Benabdeljelil and Arfaoui (2001) in Morocco. However, none of these studies was as extensive and comprehensive as the current study in describing the phenotypic characteristics of indigenous chickens. This study has described numerous parameters such as earlobe colour, skin colour, body size, spur size, egg size and wattle presence and size which have not been described in previous studies. The observation that earlobes and spurs were not prominent in most of the chickens could be because the majority of the sampled chickens were hens. Based on the exhibited variation in plumage, colour of shanks, eyes, earlobes, skin and comb types across the country, it is clear that there are various sub-types of indigenous chickens in Uganda.

Exposure to disease outbreaks, low feed resource bases and harsh environmental conditions have led to naturally selected types of chickens with high rusticity and wide diversity that may help to create improved strains of chickens selected from



the indigenous populations or crosses for specific purposes. Selection among the indigenous chickens offers the possibility of utilizing the already available and adaptable germplasm and opportunities to conserve the indigenous stocks. On the other hand, crossbreeding offers a chance to exploit heterosis and the development of synthetic lines. Previous work at our institute and on-farm studies using special crosses of indigenous hens and exotic commercial cocks have shown that sustainable acceptable performance levels with an overall economic profitability can be achieved (Ssewanyana *et al.*, 2001).

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