

Evaluation of Three Management Systems on Growth Performance of Kuchi Indigenous Chicken Ecotype of Kenya

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Abstract

Kenya has a rich diversity of indigenous chicken(IC) comprising of several ecotypes with varied characteristics in terms of egg and meat production. Kuchi ecotype is an example found mainly in Lamu County. It is known for its high mature body weight. However, interventions meant to improve on its productivity have not been adequately studied. A study was carried out to evaluate the growth performance of Kuchi growers under three management systems: Extensive system (ES), Extensive system with Supplementation (ESS) and Intensive system (IS). Experimental growers were derived from randomly collected pure Kuchi eggs which were bought, hatched artificially and managed intensively using commercial chick and growers mash from day old to eight weeks. From week 9 to 11, eighteen growers, had their initial body weights taken, then randomly allocated to the three management systems for a period of three weeks. Each system was allocated with six growers disregarding sex. At the end of the study period, their mean weight gains were: 57.83g, 53.28g, and 40.22g, for ES, ESS and IS respectively. An Analysis of Variance (ANOVA) was applied using SAS (2011) soft ware tool. Results showed that all the three systems (ES, ESS & IS) of management were not significantly ($P>0.05$) different on the growth of Kuchi growers during the study period. It is concluded that Kuchi IC ecotype can equally grow with or without confined management practice. An ESS management is therefore recommended for Kuchi IC ecotype.

Key Words: *Indigenous Chicken, Kuchi, Ecotype, Supplementation, Management System*

INTRODUCTION

The population of chicken in Kenya is about 31 million with Indigenous Chicken constituting 25 million while commercial chicken are 6 million (KNBS, 2010). Despite the large number of IC ecotypes, their characteristics in terms of egg and meat potentials have not been studied. One of these IC is the Kuchi ecotype, which has become popular for its mature body weight and diseases tolerance. Kuchi is a native chicken to the coastal region particularly Faza Island of Lamu county (Mwanza, 2011). There is therefore need to improve on its productivity through better management systems, selection and breeding (Njue *et al.*, 2005). Any flock of chicken that are kept under scavenging/ free range management system without improvement through selection for cross breeding is referred to as indigenous chicken IC (Ondwasi *et al.*, 2006). IC are kept in many parts of the world irrespective of the climate, traditions, life standards, or religious taboos relating to the consumptions of eggs and chickens as opposed to those of other farm animals like pig meat (Tadelle, 2003).

Nearly every rural homestead in Kenya keeps a chicken. This widespread population of IC clearly indicates their significance in livelihood improvement among rural families. Their management may fall under any of the following three systems. The Free range/scavenging/extensive system where no feed is supplied and the chicken forage within the homestead; The Semi-intensive system, where the chicken are partly confined to avoid conflict with crop production, but are provided with crop residues, grains and chicken wastes to supplement their daily feed requirements and the flock is not vaccinated. The Intensive system, where the flock is confined and supplied a balanced diet with vaccinations against endemic diseases. This system is not common among rural household in Kenya (Ngeno, 2010; Menge *et al.*, 2005). The free range system is prominent but is characterized by low input and output.

Despite the dominance of this system, and the large number of IC kept, scanty information exists on the potentials and their management systems in terms of egg and meat production. There exist several IC

ecotypes whose characteristics have not been adequately studied and the Kuchi ecotype of Kenya is an example.

The present study is aimed at evaluating the effects of three management systems (Extensive system (ES), Extensive system with supplementation (ESS) and Intensive system (IS) on the growth performance of Kuchi Indigenous growers aged between 9 to 11 weeks of age. The findings from the study would be used as recommendations on viable systems for adoption of Kuchi IC ecotype.

MATERIALS AND METHODS

The study was carried out at the poultry unit, Animal Science Department of University of Eldoret (UoE), Chepkolel main campus, Uasin Gishu County, Kenya. The farm is situated at latitude $0^{\circ} 31' 01''$ N, and longitude $35^{\circ} 17' 01''$ E; with an elevation of 2154m above sea level (Kareri, 2013). An average unimodal rainfall pattern of 1000mm to 1520mm per annum has been recorded over the last ten years. The rains span from February to August. The temperatures of the site range from 23.6°C day to 9.6°C night (Jaetzold & Schmidt, 1982).

The experimental birds were derived from 209 fertile randomly bought Kuchi eggs sourced from three sites, two in Kerio Valley-Sambat and Muskut, in Elgeyo of Marakwet County, and from pure Kuchi flock kept for research at the UoE in Gishu County. This IC ecotype had earlier been introduced into the region by the Ministry of Livestock Development in collaboration with the Community Agricultural Development in Semi-Arid Lands (CADSAL) in 2010. The eggs were hatched artificially at Iten Youth Polytechnic (IYP). The chicks were then managed in a brooder for three weeks before transferring them to the experimental site at the University of Eldoret-Animal Science Poultry Unit. The chicks were vaccinated against common diseases Marek's, Newcastle, Gumboro, Fowlpox and typhoid and were offered commercial type diet (Chick and Growers mash) until 8 weeks of age. At the 9th week, eighteen growers were randomly allocated to the three systems (treatments) of management: ES, ESS and IS. That is six growers in each system. All the growers were weighted at the start of the experiment and mean weights computed. The mean weekly weight gains were recorded for each system for a period of three weeks and are as shown in the Table 2. A commercial growers mash was fed to the growers *ad libitum* in IS; those in ESS, were given 60g supplement of growers mash in the morning, and then allowed to be free in the afternoon to scavenge. Those in ES were not given any feed supplementation but had a twelve hour period to scavenge. The housing was of floor pens, 12m^2 with a deep-litter (saw dust); those in ES had a scavenging area of 49m^2 , while those under ESS, and were provided with an area of 30m^2 for scavenging. The scavenge areas for the two systems were provided with a wheelbarrow load of sheep and goat manure where the chicken could be free to scavenge for insects and exercise their innate behaviour of scratching the ground as observed in all IC. Water was provided *ad libitum* in all the three systems. The housing and management procedures were arranged as shown in Table 1. A Completely Randomized experimental Design was used.

Table 1. Management lay out procedure for three weeks period

Period (weeks): Replications	Treatments (systems)	No. of growers	Pen space	Scavenge space
1	ES	6	12m^2	49m^2
2	ESS	6	12m^2	30m^2
3	IS	6	12m^2	NIL

RESULTS

During the first eight weeks before the execution of the experiment, , the growth pattern of Kuchi chicks were observed as seen in figures 1 and 2.

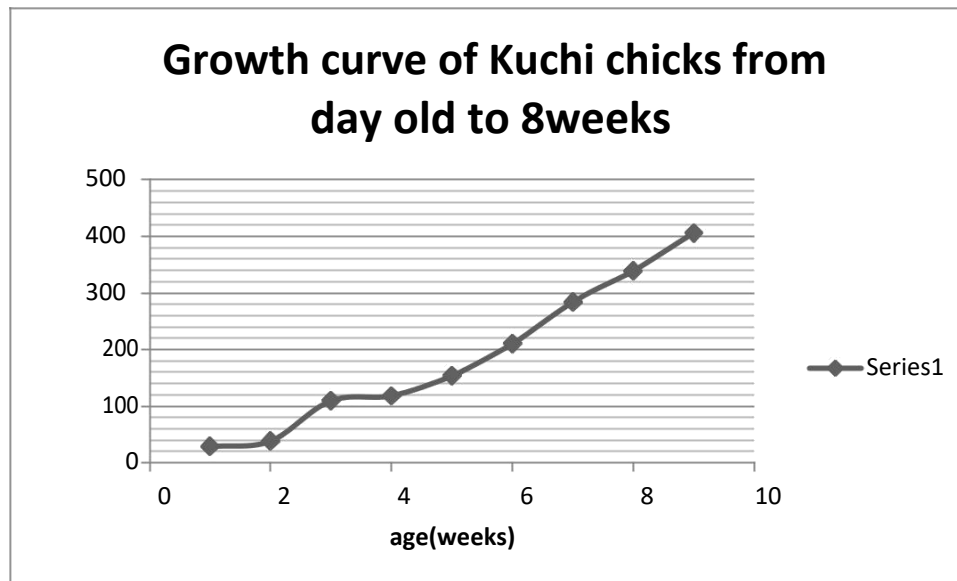


Figure 1. Growth curve for Kuchi chicks from 1 day old-8 weeks of age

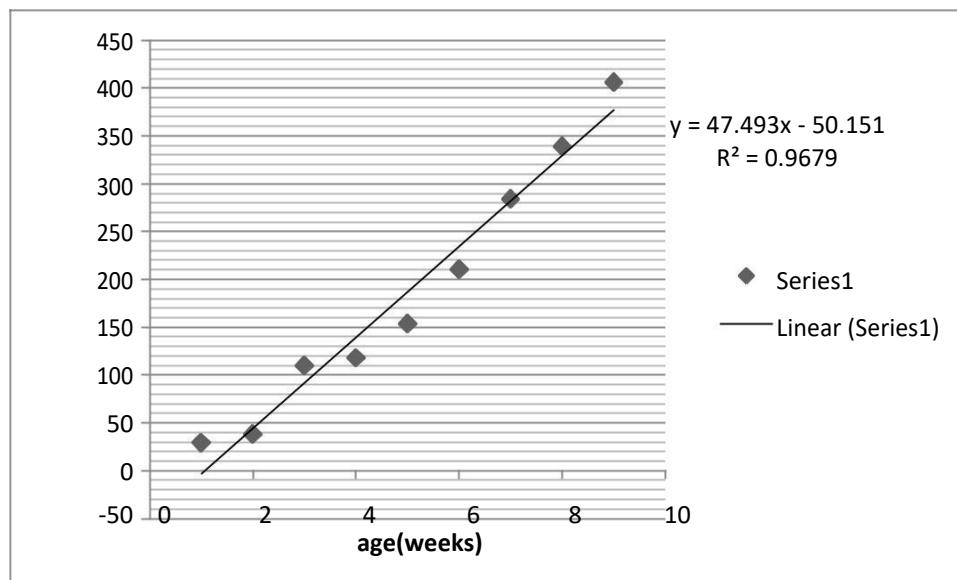


Figure 2. Regression line for the growth of Kuchi chicks from day 1- 8 weeks

At the end of the experiment at week 11, the mean weights of the Kuchi IC growers were computed and compared to determine whether the three systems of the management: ES, ESS and IS had any effect on the growth performance of the Kuchi IC. This was done by means of a One- way ANOVA in a Completely Randomized Design Little and Hills (1978). Table 2 shows the weekly summary of means during the experimental period.

Table 2. Mean weekly weight gains in g/chick during three weeks.

TREATMENTS (systems)		PERIOD (weeks)		
Replications	ES	ESS	IS	
1	35.0	51.17	30.84	
2	34.64	58.17	47.00	
3	103.83	50.50	42.83	
Means	57.83	53.28	40.22	
SD±33.23	CV=15.6		SEM=19.18	

It can be seen from a casual observation, that the weekly means (Table 2) for both ES and ESS are higher than that of IS, however, after entering them into an ANOVA, a statistical result emerged that the means were not significantly ($p > 0.05$) different.

DISCUSSION

Body weight is direct reflection of growth and it influences production and reproduction traits of birds (Niranjan *et al.*, 2008). The mean weekly body weights of Kuchi indigenous chicken at week 10 were 34.67g, 58.17g and 47.00g, for extensive system, Extensive system with supplementation and intensive system respectively. Therefore the average Daily gains for the Kuchi growers were: 4.95g, 8.3g and 6.7 g respectively. These results are closer to those reported by Msoffe *et al.* (2004), for Tanzanian free range local domestic fowl (Chingwekwe 4.7g, Nzenzegere 6g, Pemba 6.4g), between weeks 8 and 12 of age, both sexes combined. In the current study, average body weights of Kuchi indigenous chicken ecotype at week 10 managed under Extensive system, Extensive system with supplementation and Intensive system, were 505.2g, 536.7g and 505.2g respectively. These are closer to those of Light ecotypes, 560 ± 4.31 of Nigeria at 12 weeks of age (Momoh *et al.*, 2010). The Western Kenya, Narok and Bondo ecotypes of Kenya at 8 weeks old managed under intensive (Ngeno, 2010) system showed similar body weights to Kuchi ecotype at week 10. Tadelle *et al.*, (2003) also reported similar ADG (g) for local ecotypes and of Fayounui chicken of Ethiopia between 6-12 weeks of age on station management as 5.5 ± 0.2 g; This means that the type of management system has no significant effect on Average Daily Gain (ADG) of indigenous chicken.

Lwelamira *et al.*, (2008), reported a mean body net of 685g, for male and female Kuchi ecotype of 12 week of age under extensive system; this result agrees closely to those from this study of 600.8g under the same management system at 11 weeks of age. Furthermore, under intensive system; Kuchi in this study had 548g at 11 weeks, while Tanzania Kuchi under the same management system at 8 weeks had 490g and 348g for male and female respectively. This closely related to the result of this study of 458.2g (sex combined) at 9 weeks under the same management.

CONCLUSION AND RECOMMENDATION

It can be concluded that, it is not economical to intensify the management of Kuchi as seen from the study at week 9 to 11. Kuchi IC performs better under extensive management system. However, a reasonable longer period is recommended to allow treatment effects to take place. Further research is needed to establish optimal dietary energy requirements and the meat yield of Kuchi IC of Kenya.

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REFERENCES

- Community Agricultural Development Project in Semi-Arid Lands (CADSAL) (2010). *Guiding for participatory community Agricultural Development in Semi-Arid Lands*. Group Empowerment and Technology transfer based on the experience in Kerio – Valley, Kenya Nairobi, Kenya 1-8.
- Kareri, R. W. (2013). Maplandia; w www.com/Kenya/Rift_valley/Eldoret/google/settle_map/Eldoret.
- Kenya National Bureau of Statistics (KNBS) (2010). *Counting our people our people for the Implementation of Vision 2030. Population distribution by administration units*. Nairobi, Kenya 25-26.
- Little, M. & Hills, F. (1978). *Agricultural Experimentation Design and Analysis*., New York, Canada: John Wiley and Sons. 1-9, 13-27, 31-44, 47-52, 54-75.
- Lwelamira, J., Kifaro, G.C., Gwakisa, P.S. (2008). On- station and on-farm evaluation of two Tanzania chicken Ecotypes for body weight at different ages and egg production. *African Journal of Agricultural Research*, Dodoma Tanzania, 843-851.
- Menge, E.O., Kosgei, I.S. & Kahi, A. K. (2005). Bio-Economic Model to support breeding of Indigenous Chicken in different production system. *International journal of poultry Science* 4(II), 1 – 50.
- Momoh, O.M., Nwosu, C.C. & Adeyinka, I.A. (2010). Comparative Evaluation of two Nigeria local chicken Ecotypes and their crosses for growth traits. *International Journal of Poultry Science* (8) Benue, Nigeria 738-743.

- Msoffe, P.L.M., Mtambo, M.M.A., Minga, U.M., Olsen, J.E. Juul– Mdsen, H.R, Gwakisa, P.S. Mutayoba, S.K. & Katule, A.B.(2004). *Productivity and reproductive performance of the three – range local domestic fowl ecotypes in Tanzania*. Livestock Research for Rural Development 16(a) Iringa Tanzania 1-12.
- Mwanza, R. (2010). *Unveiling the Kuchi Kenya*; Poultry Industry. SAID .On-Line.
- Ngeno, K. (2010). *Genetic analysis of growth patterns in different ecotypes of indigenous chicken populations in Kenya*; MSC. Thesis Egerton University, Njoro, Kenya.pg 25.
- Niranjan, M., Sharma, R.P., Rajkrimar, U., Reddy, B.L. N., Chatterjee, R. N. & Rattchanja, T.K. (2008). Comparative evaluation of production reinforce in improved chicken variety for bee yard farming; *International Journals of Poultry Science*, Hyerad, INDIA, 1128-113.
- Njue, S. W., Kasiiti, J. L., Macharia, M.J., Gacheni, S. J. & Mbugua, H. C. W.(2002). *Health and management improvement of family poultry production in Africa. A survey results from Kenya. Results of a FAO/IAEA co-ordinate research program*. Animal Production and Health section: 39.
- Ondwasi, H.O., Wesonga, H. & Okitoi, L. (2006). *Indigenous children production manual*. Kenya Agricultural Research Institute Technical Notes No. 18, Kikuyu, Kenya 1-13.
- SAS (2011).Users guide. Statistics SAS inc. Cary NC. PG 633.
- Tadelle, D., Kijora, C., & Peters, K.J. (2003). Indigenous Children Ecotypes in Ethiopia, Growth and feed utilization potentials. *International Journal of Poultry, Science* 4(6) Berlin Germany 144-146.

BIO-DATA

Ben Chesoo is currently a PhD student in the department of Animal Science, School of Agriculture in University of Eldoret. He is very much involved in researches pertaining animal science and animal health.