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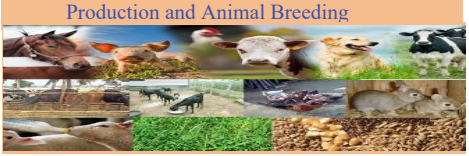

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Evaluation of egg production performane and demonstration of potchefstroom koekoek chicken breed under intensive and rural household conditions at Shashemene and Kuyera districts of West Arsi zone, Ethiopia

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ABSTRACT

This study conducted and demonstrated to evaluate the egg production performance of koekeok chicken at Shashemene and Kuyera districts of West Arsi zone, Oromiya region thereby to enhance the production and productivity of the small-scale poultry production system. In this study, five households were participated and each received 50 day-old Potchefstroom Koekoek chicks to grow and take egg production performance records by feeding starter, grower and layer feed ad lib. The complete feeds were prepared by Debre Zeit agricultural center. When the birds reached at maturity, the Age at First Egg (AFE) and body weight at sexual maturity were recorded. Egg production recorded on daily basis starting from age at first egg until 74 weeks of age in terms of egg number and Hen-Housed Egg Production (HHEP). Results of this study revealed that the age at first egg was 161 days and average number of eggs laid per hen per year was 221 eggs. The rate of lay based on HHEP for a period of one year (*i.e.* 52 weeks of production) was 60.6% and the overall mortality during the 74 weeks period was 4.81%. In conclusion, the overall performance and adaptation potential of this breed was good in this study and is highly accepted by the participated households. Therefore, it is recommended that efforts need to make the accessibility of the breed in the studied area through scaling up and also linking the veterinary services and poultry feed technologies, call attention.

Keywords: Age at first egg, Egg production, Potchefstroom koekoek chicken

INTRODUCTION

Poultry constitutes a significant source of protein and income in low-and middle income countries. Demand per capita for poultry products is predicted to increase by 100% in 2030 in those countries. Population growth and changing consumption patterns linked to urbanization and increasing wealth drive this growth in demand. The increase in demand for poultry products, in turn, drives structural changes in the sector. These may take the form of expansion, with more people producing, intensification of production and increased trade in products. According to the recent report of central statistical Authority of Ethiopia, there are about 59.4 million chickens in the country, of which 85.7% are indigenous, the remaining being improved exotic chicken breed. However, despite the benefits and huge population of chicken, the total output of this sector has remained very low due to diverse reasons. Genetic limitation, high feed cost, disease prevalence, socioeconomics and technology shortage are the major bottle necks for the development of the sector.

Potchefstroom Koekoek chicken is a breed composite of the white leghorn, black australop and bared plymouth rock and considered as a locally developed breed in South Africa. The name koekoek refers to the barred color pattern of the birds. The potchefstroom koekoek was developed for hens that lay a brown shelled egg with an average weight of 55.7 g and the cocks and culled hens that are used for meat production. The meat of this breed is very popular among local communities and is

preferred to that of the commercial broiler hybrids. The koekoek's color pattern is a sex linked gene that is very useful for color sexing in cross breeding for egg producing types of hens used in medium input production systems. The breed is very popular among rural farmers in South Africa and neighboring countries for egg and meat production as well as their ability to hatch their own offspring. The gap between supply and demand in the future per capital egg consumption is imminent, unless appropriate measures are taken for promoting chicken production. Therefore, to tackle the ever existing problem, different approaches of improved poultry technology packages dissemination should be followed on the basis of social, economic and physical environments under which the production takes place. Over all, the present study was designed to enhance. The production and productivity of small scale poultry production system in urban and peri urban areas through the following specific objectives: To introduce and evaluate the egg production performance of dual purpose potchefstroom koekoek chicken breed at farmers' intensive management condition.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted in peri urban areas of two districts, Shashemene and Kuyera, which are, respectively located at 237 kms and 250 kms southeast of the capital, Addis Ababa. The study areas were selected purposely based on the availability of services and inputs, the socio economic significance of the package, accessibility to transport and representativeness. Five Households (HHs) (three from Shashemene and two from Kuyera districts) were selected to participate in the demonstration. The participant HHs were selected in collaboration with woreda bureaus of agriculture purposively based on their experience in chicken farming, willingness to construct chicken houses, the ability to cover the associated package costs and record the required data. Thereafter, a two days training was given on basic poultry management and data recording techniques.

Distribution of Experimental Chicks and their Management

A total of 250 unsexed a day old chicks were used for the study. Each of the five HHs involved in the study were provided with 50 chicks and constructed a separate house for the chicks. They raised chicks under intensive management system in a closed confinement from day old up to the end of the experimental period (74 weeks). During this period, the birds were fed on complete feed formulated at the national poultry research farm of Debre Zeit Agricultural Research Center (DZARC). The feed was formulated based on the requirements of the chickens at their different developmental stages (*i.e.* starter, grower and layer feed of 2800 and 20; 2800 and 16; 2750 and 16.5, respectively of a metabolizable energy in kcal/kg dry matter and percent crude protein).

Feed was provided twice on average at 45, 90 and 120 g/day/bird, respectively of their growth stage of starter (0-8 weeks), grower (9-19 weeks) and layer (20-74 weeks) while water was made available freely for the chickens all the time. Newcastle disease vaccination was given immediately after hatch (ocular administration). And repeated on first and third weeks, and they were regularly vaccinated thereafter every three months as it is recommended by veterinarians. Data on egg production performance were recorded with the active involvement of each participating HHs. Body weight at sexual maturity was taken for both sexes separately. Age at first egg was recorded as number of days between date of hatching and date of their first egg by at least 5% of the total chickens in the HHs. Egg production record was taken on daily basis starting from age at first egg until 74 weeks of age. The laying intensity was estimated as number of eggs produced per henhoused divided by number of days from the start of lay to the end of experiment and this is termed as rate of lay per hen housed. Mortality was also recorded as occurred at different developmental stages (brooding, growing and laying stages).

The Hen Housed Egg Production (HHEP) was calculated using the following formula

$$\text{HHEP (\%)} = \frac{\text{Total eggs produced}}{\text{(Number of birds initially housed) x (Number of days in-lay)}} \text{x100}$$

Statistical Analysis

Descriptive statistical tools were used to analyze the data. The descriptive part includes mean values for age at first egg, subsequent body weights, egg number and weights. The Statistical Package for Social Sciences version 20 was used to enter and analyze the data.

RESULTS AND DISCUSSION

Body Weight at Sexual Maturity

During the laying period, the growth performance of chickens was evaluated taking the effect of sex into consideration. A significant ($p<0.05$) difference in the means. Of Body Weight (BW) and daily gain was observed between the two sexes. The male birds had higher BW and daily gain than that of female. Body weight at sexual maturity was 20.1 g ± 25.1 g and 14.0 g ± 25.1 g for male and female birds, respectively with an average daily gain of 13.2 g ± 0.42 g for male and 8.47 g ± 0.42 g for female. Likewise, the mean BW at 52 weeks of age was 2819 g ± 23.4 g and 2022 g ± 33.8 g for male and female chicken, respectively with an average daily gain of 2.0 g ± 0.09 g for males and 1.4 g ± 0.09 g for females. The current findings on growth performance of

the breed were relatively lower as compared to the results. Reported by South African ARC animal production institute. However, the growth performance of the breed was relatively higher as compared to the result reported under on station management conditions of potchefstroom koekoek at DZARC [10]. The present result on BW at sexual maturity for both sexes is by far higher than the average BW of the same chicken at twenty weeks of age (1.49 kg and 1.23 kg for males and females, respectively) reported, higher than the reported values. Similarly, Kasa and Saba found lower BW at 20 weeks age of 1.34 kg and 1.03 kg for male and female koekoek chicken, respectively. The difference in the performance of the breed in the present study might be attributed due to differences in the HHs management practices and type and quality of feed provided to the birds. Moreover, the birds in the present study kept in door throughout the study period without semi scavenging practices unlike the reports of previous researchers [11].

Egg Production Performance

The age at which the chickens started laying their first egg was found to be 161.4 ± 2.88 days. The average number of eggs laid per hen per year was 221 ± 4.67 eggs. The rate of lay on the basis of HHEP per production cycle (52 weeks of production) was 60.6% ± 1.14%. The average egg weight at 52 weeks of age was 54.6 g ± 3.07 g. The finding on percentage egg production (rate of lay) was comparable with the result (60.4% to 61.1%) reported by South African ARC-animal production institute. The finding on egg production performance of the current study was also comparable with the result of on station study on conducted at DZARC which was or this breed reported a higher daily percentage (67.8%) of hen housed egg production for the same breed under confinement [14].

Table 1: Average (± SD) values of age at first egg, egg number, rate of lay and egg weight of Potchefstroom koekoek chicken breed.

Parameters (days)	Mean ± SD
Egg number, hen-housed	161.4 ± 2.88
Egg production/year	221 ± 4.67
Rate of lay, hen-housed (%)	60.6 ± 1.14
Egg wt. at 52 weeks of age (g)	54.6 ± 3.07

Figure 1: The mean percentage hen housed egg production over a 52 week production cycle.

Mortality

The average mortality rate during the brooding, growing and laying periods was 10.4% ± 2.19%, 3.10% ± 2.54%, and 0.94% ± 1.29%, respectively. There was a high mortality during the first eight weeks of brooding period. It was mainly attributed to stress related to day old chick transportation to the study sites which resulted in high first week mortality (*i.e*. 6.5%). The overall mortality (4.81%) during the experimental period (74 weeks) was relatively lower as compared to mortality result (22.2%) reported.

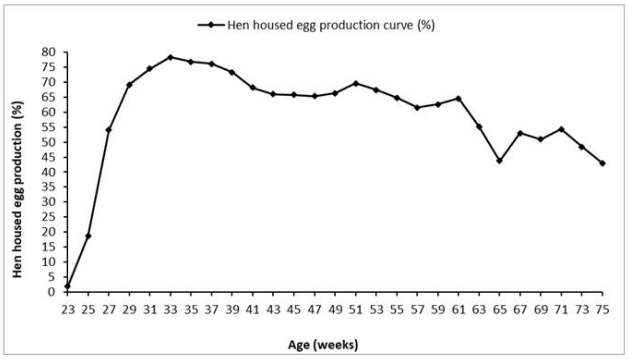

Figure 2: Potchefstroom koekoek chicken breed.

CONCLUSION

The overall performance and adaptation potential of this breed is good and is highly accepted by the participants. However, managing this breed under intensive production system at farmers' level using complete feed may not be feasible and needs further investigation. Besides, conducting further study based on locally available feed ingredients at different agro ecologies

could generate additional information that contributes to sustainable adoption of chicken technologies.

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