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Growth performance of indigenous chickens under intensive management conditions in Northwest Ethiopia

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Abstract

A study was conducted to evaluate the growth performance of indigenous and Rhode Island Red (RIR) chickens under intensive management conditions for 22 weeks using standard commercial diets. Eggs from seven indigenous chicken lines were collected from the respective administrative zones in northwest Ethiopia and hatched. The experimental layout was a Completely Randomized Design (CRD) with three replications. Data on feed consumption, body weight and related parameters were recorded up to the age of 22 weeks. The mean total feed intakes at the end of the growth phase were 13799, 15162, 13438, 13249, 13813, 13356, 14112 and 12832 g for the Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua, Mecha and RIR, respectively. There was no significant difference in feed consumption among the tested chicken ecotypes. However, a significant difference was observed in the average body weight and body weight gain between the different lines. The mean body weights for Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua, Mecha and RIR were 1191, 1186, 1054, 1222, 1038, 1249, 1257 and 1394 g, respectively. Mortality from hatching to end of the growth period was higher for all the indigenous lines in comparison to the RIR. The mortality rates from day old to 22 weeks varied from 18.9% (RIR) to 82.4% (Debre-Ellias), respectively.

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Introduction

Chickens are widely kept in Ethiopia and are by far the most numerous farm Animal Genetic Resource (AnGRs), with a total population of about 65 million (FAO, 2000). About 99% of the population consists of indigenous chickens and they are managed under scavenging systems while the remaining birds are mainly on private farms under intensive management systems. Furthermore, about 98.5% and 99.2% of the national egg and poultry meat production, respectively, are derived from traditional chicken production systems, with an average annual output of 72 300 tons of meat and 78 000 tons of eggs (AACMC, 1984; ILCA, 1993).

Establishing a constructive breeding program to address constraints related to poultry production is essential. However, the chicken genetic resources in the Amhara region of Northwest Ethiopia is becoming very sensitive due to the high rate of genetic erosion as a result of a high incidence of Newcastle disease. Furthermore, the massive distribution of exotic chicken breeds especially the Rhode Island Red (RIR) by both governmental and non-governmental organizations has resulted in the dilution of indigenous genetic stock. If this trend continues at the current rate, the gene pool of the indigenous chickens could be lost in the near future before they are properly described and studied under different management conditions. In the north-western region of Ethiopia studies to determine the production potential of traits such as meat production and productivity of indigenous chickens have never been commissioned. Therefore, the purpose of the study was to evaluate and compare the growth performance of indigenous chicken lines under intensive management conditions in Northwest Ethiopia.

Materials and Methods

A performance evaluation trial was conducted at the Andassa Livestock Research Centre (ALRC), Ethiopia, which is located 11^{o}29’ N latitude and 37^{o}29’ E longitude with an elevation of 1730 metres above sea level and is spread over an area of 360 hectares. It receives an average annual rainfall of 1150 mm with temperatures ranging from 6.5 - 30 °C.

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Seven indigenous chicken lines, namely the Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua, Mecha were identified for evaluation. About 1300 eggs per line were purchased in selected villages found in north-western Ethiopia. The eggs were hatched at the ALRC, using the hatchery units of the poultry division following standard procedures. All hatched chicks were vaccinated against Newcastle and fowl typhoid according to the recommendations of a veterinarian. The day-old chicks were sexed and the growth characteristics of the females were evaluated under intensive management conditions. In addition, 414 day-old RIR female chicks from ALRC were included in the trial as a reference control. Chicks from each line were weighed and randomly allocated to deep litter pens using a Completely Randomized Design (CRD). The chickens were offered a standard starter diet for a period of eight weeks (brooding period) after which a commercial grower diet was fed for an additional period of 14 weeks (*ad libitum)*. Data on growth characteristics such as growth rate (body weight at hatching and at 15 days intervals) and feed utilization were recorded. Mortality was recorded as it occurred. The data were analyzed using GLM of SPSS version 10 (SPSS, 1996).

Results and Discussion

Significant ($P < 0.05$) differences in day-old and final body weights were observed within the indigenous and between the indigenous and RIR chicken lines, with the highest body weight being recorded in the control (RIR) line (Table 1). The mean body weights for Tilili, Gellilia, Debre-Ellias, Mello-Hamusit, Gassay, Guangua, Mecha and RIR were 1191, 1186, 1054, 1222, 1038, 1249, 1257 and 1394 g, respectively. The Mello-Hamusit, Guangua and Mecha native chickens were the fastest growing among the indigenous lines. These results are in agreement with work done by Teketel (1986) and Sonaiya *et al.* (1999) who reported that some indigenous chicken lines in Ethiopia are very well adapted and performed very well in their respective geographical locations.

Table 1 Comparison of the growth performance of indigenous and Rode Island Red (RIR) chickens in Northwest Ethiopia from day-old to 22 weeks of age

	Indigenous chicken lines							RIR
	Tilili	Gellilia	Debre Ellias	Mello Hamusit	Gassay	Guangua	Mecha	
Day-old body wt/bird (g)	27.2 ^{d} (338)	27.8 ^{c} (263)	27.1 ^{d} (404)	26.3 ^{e} (388)	25.5 ^{f} (328)	29.3 ^{b} (395)	27.9 ^{c} (376)	35.2 ^{a} (446)
Final body wt/bird (g)	1191 ^{bd}	1186 ^{be}	1054 ^{cde}	1222 ^{bc}	1038 ^{de}	1249 ^{ab}	1257 ^{b}	1394 ^{a}
Body wt Gain (kg)	1.164 ^{bcde}	1.158 ^{bcdf}	1.027 ^{e}	1.196 ^{ad}	1.013 ^{ef}	1.220 ^{ac}	1.229 ^{ab}	1.359 ^{a}
Gain/bird /day (g)	7.6 ^{bc}	7.5 ^{bd}	6.7 ^{cd}	7.8 ^{ab}	6.6 ^{cd}	7.9 ^{ab}	8.0 ^{ab}	8.8 ^{a}
Feed intake/bird (kg)	13.8 ^{ad}	15.2 ^{a}	13.5 ^{ae}	13.3 ^{bcdef}	13.8 ^{c}	13.4 ^{af}	14.1 ^{b}	12.8 ^{bcdef}
Feed intake /bird/day (g)	89.6 ^{ab}	98.5 ^{ab}	87.3 ^{ab}	86.0 ^{b}	89.7 ^{ab}	86.7 ^{ab}	91.6 ^{ab}	83.3 ^{b}
FCR (kg feed/ kg gain)	11.9 ^{ad}	13.1 ^{ab}	13.1 ^{ac}	11.1 ^{bcde}	13.9 ^{a}	11.0 ^{bcde}	11.6 ^{ae}	9.5 ^{de}
Mortality rate (%)	67.0 ^{ab}	69.4 ^{ab}	82.4 ^{a}	53.7 ^{bc}	67.3 ^{ab}	64.0 ^{ab}	52.8 ^{bc}	18.9 ^{de}

$^{a.b.\ c.}$ Means with different superscripts in a row are significantly different at $P < 0.05$
( ) –Numbers in the brackets represent the number of day old chicks per line/breed

No significant differences were observed between the lines for daily feed intake per bird per day. The mean daily feed intake from day-old to 22 weeks of age varied from 83.3 g for RIR to 98.5 g for Gellilia lines. There were no significant differences in total feed consumption amongst the tested chicken lines.

However, higher levels of feed consumption were recorded for the indigenous lines compared to the RIR chickens. This could be related to the pronounced selective feeding and feed scratching behaviour that could have lead to an overestimation of the feed intake during the rearing period. There was, however, a significant ($P < 0.05$) difference in FCR between the indigenous and RIR chickens. Feed conversion ratio is a complex process and a highly aggregate trait which is the result of the interaction of behaviour, level of production, appetite and other factors. The feed conversion ratio (feed : gain) for all lines was poor, varying from 9.5 to 13.9 for RIR and Gassay chicken lines, respectively. This is in agreement with Solomon (2003) who observed a FCR of 13.4 in indigenous chickens kept under intensive management conditions in Ethiopia.

The mortality rate from hatching to the end of the growth period, i.e. at maturity (22 weeks of age), varied substantially between chicken lines, *viz*. from 18.9% (RIR) to 82.4% (Debre-Ellias). These results are in agreement with those reported by Teketle (1986) and Brannang & Pearson (1990) for indigenous chicken lines under similar management conditions in other regions of Ethiopia. Based on *post morten* examinations the main cause of mortality was infectious diseases such as coccidiosis, colibacilosis and infectious coryza. It is possible that the confinement of indigenous chickens results in high stress levels and associated high infection pressure from pathogens causing high morbidity and mortality.

Further studies to identify and characterize the indigenous chicken lines of the other administrative zones of the Amhara regional state should be done. This could lead to the beginning of a selection and/or crossbreeding programme within the indigenous chicken lines. In addition, care should be taken to prevent the random distribution and crossing of exotic chicken breeds in the rural parts of the country as this can lead to the extinction of some valuable indigenous chicken lines.

Conclusions

Under intensive management conditions in the north-western region of Ethiopia, the Mello-Hamusit, Guangua and Mecha chicken lines seemed to be the faster growers amongst the seven chicken lines identified. Furthermore, the growth performance of these lines is comparable to that of the exotic RIR chickens under the same management conditions. Further studies on the characterization and performance evaluation of Ethiopian indigenous chicken breeds under different management conditions are warranted. Care should be taken by government and NGO's developmental programs distributing exotic chicken breeds to farmers, to prevent uncontrolled crossbreeding and the consequent erosion of the valuable indigenous poultry genetic resources in Ethiopia.

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