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On Farm Carcass Performance Evaluation of Three Local Chicken Ecotypes in Western Zone of Tigray, Northern Ethiopia

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Abstract
The study was designed to determine the effects of chicken ecotypes, sex and their interaction on carcass performances of local chicken ecotypes in their natural environments of western zone of Tigray. Forty eight matured local chickens with 24 females (8 / ecotype) and 24 males (8 /ecotype) with age ranging from 10-12 months were purchased for carcass trait evaluation. Chickens were immediately slaughtered and defeathered manually after the purchased chickens were deprived of feed and water over night and weighted to get the actual live, carcass and carcass cuts of each chicken using a Sensitive balance of weighing scale of one gram precision. GLM procedure of SAS 9.2 was employed to determine the effects of chicken ecotypes, sex and their interaction on carcass traits of the local chickens. Tukey test was used to compare significant traits. Male chickens performed significantly ($P<0.05$) higher than females in all carcass traits. Lowland chicken ecotypes had significantly performed better than either of the rest two chicken ecotypes in all considered carcass traits except skin weight. Sex by chicken ecotypes interaction had significant effect in all considered traits ($p<0.05$). Both chicken sexes from lowland ecotypes significantly performed higher than their respective counter parts from either of the two ecotypes in almost all considered carcass traits. The variation in carcass trait performance among the chicken ecotypes is an indicator of their genetic variation with respect to carcass traits. In depth further studies on molecular assessment of genetic variations are required to validate the detected variations in carcass performances. Thus, environmentally friendly and community based holistic genetic improvement programs should be designed and implemented in order to assure sustainable improvement, utilization and in-situ conservation of the indigenous chicken genetic resources.
Key words: Carcass traits, local chicken ecotypes, western Tigray

1. Introduction

Village chickens are the easiest livestock species to rear in rural, peri-urban and urban areas of the globe because chicken raising is not labor intensive and require low inputs. Moreover, domestic chicken play a significant role in capital build up, food security attainment, malnutrition ,poverty and hunger reduction (Besbes 2009). They also have social, cultural and religious importance, and improve growth, mental development, school performances and labor productivity and reduce the likelihood of illness among the small-scale farmers' children through diversification of consumable foods (Martin *et al.* 2011). On top of these merits, poultry serve as a scaling-up enterprise to larger livestock species (Dolberg 2003).

Ethiopia has an estimated of 49.3million with indigenous chicken of non-descriptive breeds accounting 97.3%, hybrid chicken 2.32% and exotic breeds 0.38% (CSA 2011).Moreover, 97.3% of indigenous chickens has been distributed in different agro-ecological zones of Ethiopia (CSA 2011) and their distribution indicate their adaptive potential to different environmental conditions, diseases and other stresses (Halima 2007).Village chicken fulfills many roles in the livelihood of resources poor households of Ethiopia such as food security, income generation and others. Consumers usually prefer products of local chicken to exotic ones because of flavor and taste of the products (egg & meat) (Amsalu 2003). Despite their significant roles, their low performances masked their potential to uplift the living standards of their owners and contribute to rural developments in Ethiopia. This has been attributed to their low genetic potential, prevalence of diseases and predators, limited feed resources, constraints related to institutional and socio-economic and limited skill management practices (Solomon *et al.* 2013; Nebiyu *et al.* 2013; Nigussie *et al.* 2010).

Understanding of carcass performances of local chicken ecotypes under free scavenging production system has a paramount significance in designing and implementation of environmentally friendly and community based holistic genetic and performance improvement strategies in order to ensure sustainable improved chicken productivity and, sustainable utilization and conservation of indigenous chicken genetic resources to respond change in climate and to meet the ever increasing demand of chicken products. On station carcass performance evaluation of some local ecotypes, exotic and crossbreds have been done in some universities, colleges and research institutions of Ethiopia. However, little or no research on carcass performance evaluation of local chicken ecotypes under free scavenging production system had been done in Ethiopia and in particular in Tigray

region. The study, therefore, was designed to evaluate the carcass performance of three local chicken ecotypes and to assess the effects of chicken ecotypes, sex and their interaction on carcass traits of indigenous chickens in their natural environment of western zone of Tigray.

2. Materials and methods

2.1. Description of study area

The study was conducted in three agro-ecological zones of Western Zone of Tigray Regional State, Northern Ethiopia. It is one of the five administrative zones of Tigray regional state and it has four (4) districts (Setit Humera, Kafta Humera, Welkait and Tsegede) comprising of 81 kebeles with 77 rural kebeles (24, 25 and 28 kebeles from Kafta Humera, Tsegede and Welkait weredas, respectively) and 4 urban kebeles with distance range of 580–750 km from Mekelle, the capital city of Tigray. It covers an area of 1.5 million hectare with Kafta Humera accounts 48.13%, Setit Humera accounts 0.82%, Tsegede accounts 23.43% and Welkait accounts 27.62% (HARC Unpublished). The total cultivated land of the zone is 573,285 hectares (38.2%) while the uncultivated land accounts 927,000 hectares (62.8%). 341,195.25 hectares (36.8%) of the uncultivated land is covered by different plant species excluding Bowsellia and Acacia Senegal While 185,510 hectares (20%) of the unfarmed land is solely covered by both Bowsellia and Acacia Senegal. The zone consists of three agro-ecological zones (lowland, midland & highland).75%, 15.7% and 9.3% of the land coverage of the zone is kolla (lowland),weynadegga (midland) and dega (highland), respectively. The geographical location of the zone is 13°42′ to 14°28′ north latitude and 36°23′ to 37°31′ east longitude (Mekonnen *et al*. 2011).The annual rainfall of the zone ranges from 600 mm to 1800 mm while the annual temperature ranges from 27^0c to 45 ^{0}c in the lowland areas (Kolla) and 10 ^{0}c to 22 ^{0}c in both midland and highland areas of the zone. The altitude of the zone ranges from 500- 3008 m.a.s.l. The zone shares borders with Tahtay Adibayo, Tselemti and Asgede Tsimbla in the East, Sudan in West, Amhara region in South and Eritrea in the North. The study area represents a remote, tropical climate where extensive agriculture is performed manually by large numbers of migrant laborers.

Throughout the zone, livestock agriculture is the predominant economic activity with about 95% of the total population engaged directly or indirectly in it (Mekonnen *et al*. 2011). Main cattle breeds raised in the Western Zone are the local Arado (in both high land and mid land areas) and Begait cattle (in lowland areas). Semi-intensive production is practiced in Humera district, which is more urban, while extensive production system is dominant in the Welkait and Tsegede districts. The main crops cultivated in the lowland areas of the zone are sesame, cotton and sorghum while teff, wheat, barley, noug, lentils, finger millet, field peas and fababeans are cultivated crops in both midland and high land areas of the zone.

2.2. Experimental Chicken and Data Collection

A total of 48 adult local chickens with sixteen from each selected chicken ecotypes consisting of eight male and eight female having typical characteristics were purchased to evaluate the carcass characteristics of local chicken eco-types in the study zone. To avoid effect of slaughtering age, the chickens used were approximately 10 months up to 12 months in age per information provided by the owner. Immediately after purchase, the chickens were slaughtered and defeathered manually in Humera Agricultural Research Center after the purchased chickens were deprived of feed and water over night and weighted to get the actual live weight of each chicken using a Sensitive balance of weighing scale of one gram precision. Soon after slaughtering, the carcass was separated from the offal (feather, gastrointestinal tract, giblet, shank, lung, head, kidney, and sex organ). Then whole carcass weight was obtained by subtracting offal weight from live weight. The different carcass traits /cuts/ (breast with and without bone, drumstick, thigh ,back, neck ,skin and wing weight) , edible giblets (heart, liver and gizzard) and shank and paw of local chickens were separated manually and weighed based on the Meat buyers' guide developed by NAMP (2007).

Carcass weight = live weight – offal weight

$$\textbf{Dressing percentage} = \frac{\textbf{Carcass weight} \times 100}{\textbf{Live weight}}$$

2.3. Statistical analysis

General linear model procedure of SAS 9.2 (2008) was employed to determine the effects of chicken ecotypes (lowland, midland and highland), sex and their interaction on carcass traits of the local chicken ecotypes. Significant means were separated using Tukey test at 5% significant level.

The statistical model used was:

$$Y_{ijm} = \mu + W_i + G_j + GW_{ij} + E_{ijm}$$

Where Y_{ijm} = the value of the carcass trait weight of i^{th} sex of local chicken (i=2, male &female) pertaining to j^{th} ecotypes (j=3, lowland, midland & highland)

μ =overall population mean

W_i =fixed effect of i^{th} sex of local chicken (i=2, male & female)

$\mathbf{G_i}$ = fixed effect of j^{th} ecotype (j=3, lowland, midland and highland)
$\mathbf{GW_{ii}}$ = sex by ecotype interaction effect and E_{ijm}= residual error

3. Result and Discussion

The analysis of carcass traits of mature local chickens with age ranging from 10 to 12 months revealed that the overall means of live weight (gm),carcass weight (gm), dressing (%), breast with bone (gm), breast without bone (gm),back weight (gm),drumstick weight (gm),thigh weight (gm),wing weight (gm),neck weight (gm),shank weight (gm),skin weight (gm), paw weight (gm), liver weight (gm), gizzard weight (gm) and heart weight (gm) of local chicken ecotype in the study area were 1357.67±7.58, 887.86±5.47,65.13±0.24, 233.63±2.04, 148.78±1.24, 123.97±1.25, 137.97±1.13, 176.77±1.58, 122.57±0.90, 54.98±0.58, 27.63±0.48, 83.38±1.65, 33.2±0.70, 26.63±0.34, 32.21±0.50 and 8.39±0.12, respectively (Table 2).

Effect of Chicken Ecotypes on Carcass Traits

The analysis of carcass traits revealed that there was significant ($p<0.05$) differences in all studied traits except skin weight among the three chicken ecotypes (Table1). Significantly highest mean values of live weight, carcass weight, dressing percentage, breast with bone, breast without bone, drumstick weight, back weight, thigh weight, wing weight and neck weight was recorded from lowland chicken ecotypes followed by midland chicken ecotypes while least performances of these carcass traits were obtained from highland chicken ecotypes. However, the three chicken ecotypes recorded similar mean values in skin weight. Moreover, there was also significant ($p<0.05$) effect of chicken ecotype on edible giblets (gizzard, liver and heart), shank and paw weights. Superior mean values of gizzard was obtained from lowland chicken ecotypes and followed by midland chicken ecotypes while least mean value was recorded from highland chicken ecotypes. Similarly, least mean values of both heart and liver weights were recorded from highland chicken ecotypes whereas chicken ecotypes from both lowland and midland agro-ecological zones were similarly performed better in both giblets.

Effect of Sex on Carcass Characteristics

The result of carcass trait evaluation indicated that there was significant ($p<0.05$) effect of sex on all studied carcass traits, edible giblets (gizzard and heart), shank and paw weights (Table 2). Male chickens had significantly superior mean values in all considered carcass traits, shank and paw weight, gizzard and heart to female chickens. However, both sexes had similar mean values in liver weight.

Sex and Chicken Ecotypes Interaction Effects on Carcass Traits

The result revealed that sex by chicken ecotypes interaction had significant effect in all considered traits ($p<0.05$) (Table 2). significantly ($p<0.05$) highest mean values in live body weight, carcass weight, dressing percentage, breast weight with bone, breast without bone, back weight, drumstick weight, thigh weight, wing weight, neck weight and paw weight were obtained from lowland male chicken ecotypes and followed by midland male chicken ecotypes while least performance of these traits were recorded from highland male chicken ecotypes. However, highland male chicken ecotypes performed significantly higher ($p<0.05$) in line with skin weight (109.14±4.1 gm) than lowland (92.80±4.1gm) and midland (81.74±4.1gm) male chicken ecotypes. Both lowland and midland male chicken ecotypes performed equally in both liver and gizzard weights and significantly higher than highland male chicken ecotypes. Similar mean values in heart and shank weights were obtained from all male chicken ecotypes.

In the same way, significantly superior average performance in live body weight, carcass weight, breast weight with bone and thigh weight was recorded from lowland female chicken ecotypes followed by midland female chicken ecotypes while least mean values were observed from highland female ecotypes. Similar performances of breast without bone, drumstick weight, heart weight and wing weight were recorded from both lowland and midland female chicken ecotypes and significantly higher than highland female chicken ecotypes. Neck weight performance of lowland female chicken ecotypes was significantly higher than performance of highland female chicken ecotypes but not different from midland female chicken ecotypes. However, significantly higher mean values in shank weight were obtained from highland female ecotypes than lowland female ecotypes but not different from midland female chicken ecotypes. All female chickens had similar mean values in dressing percentage, skin weight and back weight. Overall, males were significantly superior to female chickens in all chicken ecotypes with respect to all studied carcass traits in the study area. Lowland chicken ecotypes had superior carcass traits' performances to the rest two chicken ecotypes. This result confirmed that agro ecology/chicken ecotypes caused variations in carcass traits' performances of local chickens.

This result is somewhat comparable with findings of Bogale (2008) who reported the slaughter weight, carcass weight and dressing percentage of Fogera local cock were 1540 gm, 878.6 gm and 58.5% but dissimilar with the slaughter weight (1100 gm), carcass weight (543.8 gm) and dressing percentage (49.38%) of Fogera local hens

in Fogera district of Ethiopia. Moreover, comparable results have been reported from North Wollo zone (Addisu 2012) that showed the live weight of male at 24.25±0.04 week's age and female at 23.84±05 week's age were 1500.97 gm and 1253.36 gm. Halima (2007) also reported relatively similar on pre slaughter weight (1044.67±214.97-1517±288.75 gm for male, carcass weight (625.33±272.78-955.33±209.12 gm for males) and dressing percentage (53.33±0.15-66.67±0.9% for males), (102.7-147 gm for males & 49.3-82.3 gm for females), neck weight (33-61 gm for males & 20.3-32.7 gm for females), heart weight (6-9.7 gm for males & 4.3-8 gm for females), gizzard weight (24-37.3 gm for males & 17-32 gm for females), liver weight (21-27.7 gm for males & 15.7-33.7 gm for females) but incomparable results on pre slaughter weight (642±229.68-873.5±499.92 gm for females), carcass weight (387±142.45-570.33±72.57 gm for females) and dressing percentage (56.33±0.08-73.33±0.18 for females), thigh and drumstick weight (194-311 gm for males & 114.7-168 gm for females) and breast and wing weight (231.6-363.3gm for males & 164-241 gm for females) of local chickens at 22 weeks age in Northwest Ethiopia. In Benin, Youssao *et al*. (2012) reported lower values for live weight of indigenous male chickens at 24 weeks age of Savannah (1215± 178 gm) & Forest (992±49 gm), carcass weight (913±135 gm for savannah & 743±45 gm for forest), thigh and drumstick (184±24 gm for savannah & 151±16 gm for forest), wing weight (118±22 gm for savannah & 89±8 gm for forest), liver weight (10.75± 4.6 gm for savannah & 8.7±1.9 gm for forest), gizzard weight (21.67±6.3 gm for savannah & 21.3±3.9 gm for forest) but nearly similar values for neck weight (76.7±19.7 gm for savannah & 60±4.3 gm for forest) and heart weight (6.6±1.1 gm for savannah & 5.9±0.2 gm for forest). However, Mandisa (2012) reported higher values for body weight of South African indigenous male chicken breeds at 20 weeks age (3.0±0.08 kg for Black Australorp, 2.4±0.09 kg for Ovambo, 2.5±0.08 kg for Potchefstroom Koekoek & 2.7±0.10 kg for Venda), carcass weight (1950±79.43 gm for Black Australorp, 1644±79.43 gm for Ovambo, 1685±75.36 gm for Potchefstroom Koekoek & 1697±90.07 gm for Venda),breast weight (500.7±21.89 gm for Black Australorp, 389.7±21.89 gm for Ovambo, 395.5±20.76 gm for Potchefstroom Koekoek & 428.5±24.82 gm for Venda), thigh weight (368.2±13.21 gm for Black Australorp, 293±13.21 gm for Ovambo, 315.2±12.54 gm for Potchefstroom Koekoek & 315.1±14.98 gm for Venda), drumstick (343.4±13.48 gm for Black Australorp, 268.8±13.48 gm for Ovambo, 289.1±12.79 gm for Potchefstroom Koekoek & 279.8±15.29 gm for Venda), back weight (325.2±20.31 gm for Black Australorp, 324.7±20.31 gm for Ovambo, 288.1±19.27 gm for Potchefstroom Koekoek & 310.9±23.03 gm for Venda), neck weight (158.42±9.33 gm for Black Australorp, 127.3±9.33 gm for Ovambo,151.9±8.85 gm for Potchefstroom Koekoek & 143.9±10.58 gm for Venda) ,liver weight (55.7±2.98 gm for Black Australorp, 42.2±2.98 gm for Ovambo, 45.2±2.82 gm for Potchefstroom Koekoek & 53.4±3.38 gm for Venda), heart weight (20.1±0.89 gm for Black Australorp, 16.9±0.89 gm for Ovambo, 18.0±0.85 gm for Potchefstroom Koekoek & 18.±1.01 for Venda) and gizzard weight (56.0±2.85 gm for Black Australorp, 47.5±2.85 gm for Ovambo, 51.5±2.719 gm for Potchefstroom Koekoek & 64.4±3.3 gm for Venda) but somewhat similar values of wing weight (118.8±3.9 gm for Black Australorp, 94.5±3.90 gm for Ovambo, 97.3±3.70 gm for Potchefstroom Koekoek & 101.6±4.43 gm for Venda). Similarly, Isidahomen *et al*. (2012) also reported higher values for slaughter weight of Nigerian local chickens at 20 weeks (2122±51.36 gm for male & 1275.0±4.46 gm for female), carcass weight (1278±46.18 gm for male & 924±8.32 gm for female), shank weight (45.80±0.75 gm for male &38±0.07 gm for female), drumstick weight (302.4±5.85 gm for male & 242.4±2.01 gm for female), back weight (194.8±2.31 gm for male & 188±1.87 gm for female) and neck weight (81.2±0.32gm for male & 72.20±0.52 gm for female) but nearly similar values for wing weight (113.2±1.49 gm for male & 94.4±1.43 gm for female), breast weight (231.8±5.91 gm for male & 176±4.55 gm for female), gizzard weight (27.4±0.17 gm for male & 27.2±0.14 gm for female), heart weight (8.8±0.4 gm for male & 6.8±0.21 gm for female) and liver weight (23.2±0.18 gm for male & 22.6±0.13 gm for female).

The differences between the findings in this study and the previous on carcass traits evaluation of domestic chickens in different areas might be due to the differences in the genetic makeup of the chickens, slaughtering age, production environments, management and other managemental related factors. The phenotypic discrepancies among the three chicken ecotypes with respect to carcass traits is due to their genetic differences which arises due to the influences of natural selection (enhances differential survival and reproductive success) and geographic isolation which splits a population into two or more reproductively-isolated subpopulations by physical barriers of gene flow among them and their genetic difference will become more and more as time goes. The male' superiority in carcass traits performances were probably due to hormonal (especially Androgen and estrogen) differential effects on growth and muscle development between both sexes. Moreover, it was also reported that the difference might be due to the aggressiveness and dominance of males over females especially when both sexes are offered feed and water together (Ilori *et al*. 2010; Isidahomen *et al*. 2012).

4. Conclusion

Male chickens performed significantly ($P<0.05$) higher than females in all carcass traits and edible giblets except liver weight because of their physiological variations which may be arise due to differential effects of hormones. Lowland Chicken ecotypes had significantly performed better than either of the rest two chicken ecotypes in all

considered carcass traits except skin weight. Sex by chicken ecotypes interaction had significant effect in all considered traits ($p<0.05$). Male chickens form lowland ecotypes significantly performed higher than male chickens from either of the two ecotypes in all considered carcass traits except skin weight while the highest mean values of skin weight was obtained from highland male chickens. Similarly, female from lowland chickens performed better than females from either of the two chicken ecotypes in most of the carcass traits. The variation in carcass trait performance among the three local chicken ecotypes is an indicator of their genetic variation with respect to carcass traits. In depth further studies on molecular assessment of genetic variations are required to validate the detected variations in carcass performance among the chicken ecotypes. Thus, environmentally friendly and community based holistic genetic improvement programs should be designed and implemented in order to assure sustainable improvement, utilization and in-situ conservation of the indigenous chicken genetic resources.

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5. Reference

Addisu, H. (2012). Phenotypic Characterization of Indigenous Chicken Ecotypes in North Wollo, Amhara Regional State, Ethiopia. M.Sc. Thesis submitted to the School of Graduate of Bahirdar University, Bahirdar, Ethiopia.

Amsalu, A. (2003). Practical Poultry Training Manual (Unpublished). Amhara Region Agricultural Research Institute, Kombolcha Poultry Research and Multiplication Center.

Besbes, B. (2009). Genotype Evaluation and Breeding of Poultry for Performance under Sub-Optimal Village Conditions. *World poultry Science journal*, 65:260-275.

Bogale, K. (2008). In Situ Characterization of Local Chicken Eco-Type for Functional Traits and Production System in Fogera Woreda, Amhara Regional State.Msc.Thesis Submitted to the School of Graduate of Haramaya University, Haramaya, Ethiopia.

CSA (Centeral Statistics Agency). (2011). Agricultural Sample Survey 2010/11. Statistical Bulletin 2: 505 Report on Livestock and Livestock Characteristics, Addis Ababa.

Dolberg, F. (2003). Review of Household Poultry Production as a Tool in Poverty Reduction with Focus on Bangladesh and India. FAO Pro-Poor Livestock Policy Initiative Working Paper No. 6. Food and Agriculture Organizations of the United Nations. Rome.

Halima, H. (2007). Phenotypic and Genetic Characterization of Indigenous Chicken Populations in Northwest Ethiopia. PhD Thesis Submitted to the Faculty of Natural and Agricultural Sciences Department of Animal, Wildlife and Grassland Sciences University of the Free State, Bloemfontein, South Africa.

HARC (Humera Agricultural Research Center). (2013). Annual Report on district wise land coverage of Western zone of Tigray (unpublished).

Ilori, B.M., Peters, S.O., Ikeobi, C.O.N., Bamgbose, A.M., Isidahomen, C.E. & Ozoje, M.O. (2010). Comparative Assessment of Growth in Pure and Crossbred Turkeys in a Humid Tropical Environment. *International Journal of Poultry Sciences*, 9(4):368-375.

Isidahomen, C.E., Ilori B.M. & Alkano, K. (2012). Genetic and Sex Differences in Carcass Traits of Nigerian Indigenous Chickens. *J.Anim.Sci. Adv*., 2(7): 637-648.

Mandisa, B.A.M.(2012). Morphometric Characteristics and Consumer Acceptability of Meat from Potchefstroom Koekoek, Black Australorp Venda and Ovambo Chickens.A Dissertation Submitted to the Discipline of Animal and poultry science school of Agriculture, Earth and Environmental sciences college of Agriculture, Engineering and science university of Kwazalu-Natal Pietermaritzburg, South Africa.

Martin, H., Frands, D. & Robyn, A. (2011). Products and Profit from Poultry.FAO Diversification Booklet 3.Second Edition. Rural Infrastructure and Agro-Industries Division Food and Agriculture Organization of the United Nations, Rome Italy, Pp 1-14.

Mekonnen H., Kalayou, S., Kyule, M., Asfaha, M., & Belihu, K. (2011). Effect of Brucella Infection on Reproduction Conditions of Female Breeding Cattle and Its Public Health Significance in Western Tigray, Northern Ethiopia. *Veterinary medicine international*. 354943. doi:10.4061/2011/354943.

NAMP (North American Meat Processors Association). (2007). THE BUYERS' GUIDE of Beef, Lamb, Veal, Pork and Poultry. John Wiley & Sons, Inc, Hoboken, New Jersey, Canada.PP.215-262.

Nebiyu, Y., Brhan, T. and Kelay, B.(2013). Characterization of Village Chicken Production Performance under Scavenging System in Halaba District of Southern Ethiopia.*Ethiop.Vet.J.*, 17 (1):69-80.

Nigussie, D., Tadelle, D., Liesbeth, H., van der, W., Johan AM, van A. (2010). Production objectives and trait preferences of village poultry producers of Ethiopia: implications for designing breeding schemes utilizing indigenous chicken genetic resources .*Trop Anim Health prod*., 42:1519-1529.

SAS. (2008). Statistical Analysis System. Version 9.2, SAS Institute Inc., Cary, NC., USA.

Solomon, Z., Binyam, K., Bilatu, A. & Ferede, A. (2013). Village Chicken Production Systems in Metekel Zone, Northwest Ethiopia.*Wudpecker Journal of Agricultural Research*, 2(9):256-262.

Youssao,I.A.K., Alkoiret, I.T.,Dahouda,M.,.Assogba,M.N.,Idrissou,N.D.,Koyang,B.B., Yapi-Gnaore, V., Assogba, H.M., Hownsou, A.S., Ahounou, S.G., Tougan, U.P., Rognon ,X.& Tixier-Boichard, M. (2012). Comparsion of Growth Performance, Carcass Characteristics and Meat Quality of Benin Indigenous Chickens and Label Rouge(T55 X SAS1).*African Journal of Biotechnology*,11(9):15569-15579.

Table 1-Effect of chicken ecotypes on carcass traits of local chicken under scavenging production system of western zone of Tigray (Lsmeans±Standard error of mean)

Carcass traits	Chicken ecotypes				
	Lowland	Midland	Highland	Overall	CV
Live weight(gm)	1458.22± 13.13^{a}	1362.84± 13.13 ^{b}	1251.96±13.13^{c}	1357.67±7.58	3.87
Carcass weight (gm)	980.44±9.47^{a}	880.45±9.47^{b}	802.68±9.47 ^{c}	887.86±5.47	4.27
Dressing (%)	66.96 ±0.42^{a}	64.39 ±0.42^{b}	64.04±0.42^{b}	65.13±0.24	2.59
Breast with bone (gm)	256.94 ± 3.53^{a}	233.94±3.53^{b}	210.02±3.53^{c}	233.63 ±2.04	6.05
Breast without bone (gm)	162.09 ±2.15^{a}	153.65±2.15^{b}	130.61±2.15^{c}	148.78 ±1.24	5.77
Back weight(gm)	133.63± 2.17 ^{a}	116.17±2.17^{b}	122.11±2.17^{b}	123.97±1.25	7.00
Drumstick weight (gm)	151.11±1.95^{a}	142.96± 1.95^{b}	119.84± 1.95^{c}	137.97±1.13	5.67
Thigh weight(gm)	199.27± 2.74^{a}	178.942.74^{b}	152.10± 2.74^{c}	176.77±1.58	6.19
Wing weight(gm)	137.28± 1.56a	103.53±1.56^{b}	126.90± 1.56^{c}	122.57±0.90	5.09
Neck weight (gm)	61.49± 1.00^{a}	55.31± 1.00 ^{b}	48.15 ±1.00^{c}	54.98±0.58	7.30
Shank weight(gm)	28.79 ±0.83^{a}	25.06 ±0.83^{b}	29.05±0.83^{a}	27.63±0.48	12.00
Skin weight(gm)	86.11±2.86^{a}	77.93 ±2.86 ^{a}	86.094 2.86^{a}	83.38±1.65	13.74
Paw weight (gm)	39.37±1.23^{a}	35.28±1.23^{b}	24.97 1.23 ^{b}	33.21±0.70	14.65
Edible Giblets					
Liver weight(gm)	28.08 ±0.58 ^{a}	27.68 ± 0.58 ^{a}	24.12±0.58^{b}	26.63±0.34	8.76
Gizzard weight(gm)	37.79 ± 0.86^{a}	33.79 ± 0.861^{b}	25.05 ± 0.86^{c}	32.21±0.50	10.69
Heart weight(gm)	8.74 ± 0.21 ^{a}	8.68 ±0.21 ^{a}	7.75±0.21 ^{b}	8.39±0.12	10.17

Ls means with different superscripts are significantly different ($p<0.05$)

Table 2: Least square means for carcass traits of local chicken ecotypes at the age of 10-12 months in scavenging production system of western zone of Tigray (Lsmeans± Standard error of mean)

Carcass traits (gram)		Chicken ecotypes					
	Sex	Lowland	Midland	Highland	Total	Overall	CV
Live wt	M	1638.99 ± 18.6^{a}	1527.91± 18.6^{b}	1387.7±18.6^{c}	1518.21 ±10.7^{a}	1357.67±7.6	3.87
	F	1277.45± 18.6^{d}	1197.76± 18.6^{e}	1116.2± 18.6^{f}	1197.14±10.7^{b}		
Carcass wt	M	1133.65± 13.4^{a}	1015.54 ±13.4^{b}	899.85 ±13.4^{c}	1016.35 ±7.7^{a}	887.86 ±5.5	4.27
	F	827.23 ±13.4^{d}	745.36±13.4 ^{e}	705.51 ±13.4^{e}	759.36± 7.7^{b}		
Dressing (%)	M	69.16 ±0.6^{a}	66.47± 0.6^{b}	64.84 ± 0.6^{bc}	66.82± 0.3^{a}	65.13 ±0.2	2.59
	F	64.75±0.6^{bcd}	62.30 ±0.6 ^{d}	63.23± 0.6^{cd}	63.43 ± 0.3^{b}		
Breast wb	M	294.94 ± 5.0^{a}	270.69 ±5.0 ^{b}	246.70 ±5.0c	270.78 ±2.9^{a}	233.63 ±2.0	6.05
	F	218.94 ± 5.0^{d}	197.20 ±5.0 ^{e}	173.34 ± 5.0^{f}	196.49± 2.9^{b}		
Breast wob	M	184.91± 3.04^{a}	169.70 ±3.0^{b}	154.83± 3.0^{c}	169.81±1.8^{a}	148.78 ±1.2	5.77
	F	139.26 ± 3.04^{d}	137.60±3.0^{d}	106.4± 3.0^{e}	127.75 ± 1.8^{b}		
Back wt	M	154.41±3.07^{a}	125.89 ± 3.1^{b}	139.3 ±3.1^{c}	139.86±1.8^{a}	123.97 ±1.3	7.00
	F	112.85 ±3.07^{d}	106.45 ±3.1^{d}	104.9 ± 3.1^{d}	108.08 ±1.8^{b}		
Drumstick wt	M	180.93 ±2.8^{a}	168.00 ±2.8^{b}	140.68±2.8^{c}	163.20 ± 1.6^{a}	137.97± 1.1	5.67
	F	121.29 ± 2.8^{d}	117.93 ±2.8^{d}	99.01± 2.8^{e}	112.74 ±1.6 ^{b}		
Thigh wt	M	237.31 ±3.9^{a}	217.86 ±3.87^{b}	186.63 ±3.9^{c}	213.94 ±2.2 ^{a}	176.77±1.6	6.19
	F	161.23± 3.9^{d}	140.03 ±3.9^{e}	117.58± 3.9^{f}	139.61 ±2.2 ^{b}		
Wing wt	M	159.63± 2.2^{a}	146.03 ±2.2^{b}	125.89 ±2.2^{c}	143.85 ±1.3 ^{a}	122.57 ±0.9	5.09
	F	114.94 ±2.2^{d}	107.78 ±2.2^{d}	81.18 ± 2.2^{e}	101.30 ± 1.3^{b}		
Neck wt	M	75.63 ±1.4^{a}	63.96 ±1.4^{b}	55.13± 1.4 ^{c}	64.91 ±0.8^{a}	54.98 ±0.6	7.30
	F	47.36 ± 1.4^{d}	46.65±1.4^{de}	41.16± 1.4^{e}	45.06±0.8 ^{b}		
Shank wt	M	37.56 ± 1.2^{a}	29.20 ±1.2^{bc}	32.89±1.2^{ab}	33.22 ±0.7^{a}	27.63 ± 0.5	12.0
	F	20.03± 1.2^{e}	20.91 ±1.2^{de}	25.21± 1.2^{cd}	22.05 ±0.7^{b}		
Skin wt	M	92.80± 4.1^{ab}	81.74 ±4.1^{bc}	109.14± 4.1^{a}	94.56 ±2.3 ^{a}	83.38±1.7	13.74
	F	79.43± 4.1^{bcd}	74.11 ±4.1^{cd}	63.05± 4.1^{d}	72.20 ±2.3^{b}		
Paw wt	M	54.29 ±1.7^{a}	42.90±1.7^{b}	32.53 ±1.7^{c}	43.24 ±1.0^{a}	33.2± 0.7	14.65
	F	24.45 ±1.7^{de}	27.66±1.7^{cd}	17.41± 1.7^{e}	23.17 ±1.0^{b}		
Edible giblets (gram)							
Liver wt	M	29.13 ± 0.8^{a}	27.76 ±0.8^{a}	21.83± 0.8^{b}	26.24 ±0.5^{a}	26.63 ±0.3	8.76
	F	27.03 ±0.8^{a}	27.60 ±0.8^{a}	26.47 ± 0.8^{a}	27.03 ±0.5^{a}		
Gizzardwt	M	37.25 ±1.2^{a}	33.95±1.2^{ab}	20.65± 1.2^{c}	30.62 ± 0.7^{b}	32.21± 0.5	10.69
	F	38.33 ±1.2^{a}	33.64 ±1.2^{ab}	29.44± 1.2^{b}	33.80 ± 0.7^{a}		
Heart wt	M	9.66 ± 0.3^{a}	9.95 ±0.3^{a}	9.76± 0.3^{a}	9.79 ±0.2^{a}	8.39 ±0.1	10.17
	F	7.81 ±0.3^{b}	7.41 ±0.3^{b}	5.74 ± 0.3^{c}	6.99 ±0.2^{b}		

Ls means with different superscripts are significantly different ($p<0.05$)

Breast wb= weight of breast with bone, and Breast wob=Weight of breast without bone

M= male and F=female

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