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ON-FARM PHENOTYPIC CHARACTERIZATION OF INDIGENOUS CHICKEN POPULATIONS IN GUJI ZONEOF OROMIA NATIONAL REGINAL STATE, ETHIOPIA

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ABSTRACT

Phenotypic characterization of indigenous chicken resources wereundertaken in Guji zone of Oromia region. Data were collected from 48 randomly selected households (HHs) using structured questionnaires. Total 244 matured local chickens of 203 and 41 female and male were involved for both qualitative and quantitative phenotypic parameters and only unrelated adult birds were sampled for the recording. The data were analyzed using SPSS software, version 22 (SPSS, 2016). The same software were used for quantitative variables such as body weight, shank length, shank circumferences, wing length (span) were analyses to obtain descriptive statistic GLM multivariate analysis and Indexing formula. The household characteristic result revealed that male were highly participated 83.3-100% in responded questionaries' of which most of 31.3 and 37.55% from all respondents were illiterate and grade1-4 levels respectively. The livestock importance index result revealed that 0.480 (48.0%), 0.209 (20.9%), and 0.148 (14.8%) were cattle, chicken and sheep respectively. all HHs conditionally provide feed and water and used feed source of 54.2% and 16.7% of Grain + leftover and Grain crop residue. Disease incidence of 57.4% and reacted only1.3% and 4.92% of traditional and modern treatment. Owner of local chicken in the study area have market problems of 43.7% and they housed there birds constructed from different sources and Parts of house subjected were Roof, wall and floor which were made of 51.4% of wood, 22.9% of grass/bush, 14.3% of (wood + mud) 8.6% of (bamboo), and 2.9% of (bamboo + grass).Results of qualitative traitanalyzedin number and percentage of each levels of quantitative traits were comb size percent, ear lobe, super present, shank feather present were analyzed and revealed that98.8%, 68.9% 100% of presence of earlobe, super and no shank feathers in population of local chicken and alsocolors subjected neck, body and tail were dominated by 55.7%, 60.7%, and 58% of (mottled) respectively. The dominated color with 45.2% white, 42.2% golden and 61.1% blue of earlobe, eye, and shank respectively. The mean separation with standard errors of the chicken numbers population sizewere 18.5±1.97 of (3.4±.32) and (2.1± .30) with a ratio of 3.2:1 female with male. Population of young chicks were highest in umber (7.0 ± .70) followed by pullets (3.5 ±.33), hens (3.4 ±.3, cockerels (2.5 ±.32) and cocks (2.1± .30) per household respectively. The average mean values of all parameters except average body weight and Super Length were significantly different at (P<0.05) level between location.Quantitative traits between sex were significantly greater value at (p<0.05) level 2.1±0.05kg and 1.5±0.02 average body weight (ABW) of male and female respectively. Live body weight was positively correlated (r=.59, 72, .67, .73, .61, 55, P < 0.01) with Wing span top, Wing span under Body length, Chest circumference, Shank length,and Shank circumference respectively. Performances trait value of mean±SE local hens under farmer's management condition were 16.23±.56, 12.56±.61, 6.77±.43, 77.9%, 53.7%, 5.98 ± 20, 5.98±.20, 6.04±.17,79.09±4.52, 6.00±.66, 2.79±.13, 9.19±.41, and 8.02±.32 number of eggs laid/single clutch period; Number of chicks hatched/time/hen; Number of chicks surviving to adulthood; Hatchability percentage (%); Survival percentage (%); sexual maturity of male; sexual maturity of female; age at first egg production (month; Number eggs produced/hen/year; Broodiness interval average (weeks); Number of hatches/ year/hen; marketable age of male chicken;, marketable age of female of local chicken in the study area.All this qualitative and quantitative traits variations could be used as source of selection for improving the chickens of study area and positively affect breeding program in the future through community based improvement, conservation and setting wisely sustainable utilization programs in study area with participating indigenous farmers..

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INTRODUCTION

Poultry is by far the most widely distributed livestock species worldwide (FAO, 2000), The Food and Agriculture Organization of the United Nations estimated that in 2009 there were nearly fifty billion chickens in the world and by the year 2015 that estimates poultry would account for 40% of all animal protein in the world. Ethiopian indigenous chicken population is estimated to be 53.6 million and producing about 108million of eggs/year (CSA, 2015). In Ethiopia, the average flock size under rural chicken production system ranges from 7 – 10 birds in each house hold consisting of 2 – 4 adult hens, one cock and some growers of different age groups and

also13chickens population per household was reported by (Samson Leta and Endalew Bekana, 2010) at mild refit valley region of Oromia. The egg production is estimated to be 40 to 60 eggs / birds /year with an average egg weight of 40 grams Bushra Badhaso (2012). Ethiopian chicken rearing system is characterized by extensive scavenging management, no immunization programs, increased risk of exposure of birds to disease and predators, and reproduction entirely based on uncontrolled natural mating and hatching of eggs using broody hens, where there is no or minimum intervention to maximize their production and reproductive performance Tadelle Dessie (2003)and (Samson Leta and Endalew Bekana,2010) reported that the dominant Chicken production system of in Mid Rift Valley of Oromia was a free range system using majority of indigenous chicken (94%) managed mainly on scavenging with conditional feed supplementation. the study on Assessment of village chicken production system and evaluation of the productive and reproductive performance of local chicken ecotype in Bure districtalso revealed that the dominant (83%) chicken production system was an extensive/traditional type of production, using a majority (97%) of local chicken ecotypes, managed mainly on scavenging with seasonal supplementation of home grown grains and household food leftovers (Fisseha *et al*., 2010).

The same author also reported that of Genetic variations in chickens can be described, amongother approaches, using monogenic traits based on pigmentationdifferences and comb types and alsoAccording Bushra Badhaso (2012) Morphological variations of indigenous chicken ecotypes (between and within) are described in terms of comb types, shank types, earlobe types, plumage colors and other qualitative traits. Commonly observed plumage colors of indigenous chickens are: red, white, black, multicolor, black with red strips, white with red strips and red-brownish).In this regard some study results on phenotypic traits were reported previously like plume colors 15% red, 18% white. 7% black 16%brown,15%golden(Ngussie et al., 2010),28% red, 30%white and 8% black by (Bogal 2008), 16.44% red, 25.49white, 7.79% black 22.23%grayish by (Halima 2007) and 20% red, 18.8 white, 13.9% balck and 18.9% red brown by (Duguma 2008) on Morphological features of indigenous chicken populations of Fogera Woreda, Amhara Regional State, Northwest Ethiopia and Phenotypic characterization of some indigenous chicken ecotypes of Ethiopia respectively. Variable earlobe colors were also reported by (Ngussie *et al*. 2010) and (Bogal 2008)40% white,52 % red, 8%yellow and 26% white and 74%white and red respectively. The same author also reported that feather presence on the neck and shank were 98%, 100% and 100%, 97.52% (Bogale 2006, Halima 2007).According to in (Bogale 2008 and Ngussie etal.,2010) Shank colors value were also revealed 28% white, 12% black and 60 % yellow in both authors result.

Ethiopia the genetic basis of this variation was described by Eriksson et al. (2007). In addition to their significance in describing genetic variations and adaptive attributes, qualitative morphological traits have important economic value in chickens. There are specific choices for plumage and skin colorsthat affect preferences of different geographic markets around the world (Jiang, 1999; Smyth, 1990).But In Ethiopia there is no specific preference for skin color, while plumage coloris only second in importance to live weight in affecting market preference for chickens (Ngussie *et al*., 2010).

In certain communities of Ethiopia. Tadelle (2003) referred to them as "local chicken ecotypes" and Halima et al. (2007) as "native chicken populations", both named on the basis of the geographic region of sampling. Each local ecotype or native population actually comprised chickens with a wide range of morphologic or genetic diversity. Thus far, only 5 Ethiopian chicken types have been listed in the Domestic Animal Diversity Information System (DAD-IS) of the FAO (derived from FAO, 2008) and 10 in the Domestic Animal Genetic Resources Information System (DAGRIS) of the International Livestock Research Institute (ILRI; derived from DAGR-IS, 2008). The objectives of this study were to describe the physicalfeatures of different populations of indigenous chickensin the study area and to assess the morphological variations among thepopulations in order to depict the useful attributes of indigenouschickens. This work were also contribute to minimize theexisting scarce information on the indigenous chicken geneticresources of Ethiopia. To bring their attentions of researchers and concerned body to conserve and utilizesustainably our indigenous genetic traits as source of variation for selection and improvements as well as the obtained variation of phenotypic traits might be used to farther detailed study of genes to DNA levels separation.

MATERIALS AND METHODS

Description of study areas

Uraga and Ana-Sora districts are parts ofGuji zone in Oromia National Reginal State in Ethiopia. They are located 610km distance away from Addis to east south direction from addis'. The minimum and maximum annual average temperature is 15^{o}c and 25^{o}cand the minimum and maximum annual average rain fall is 1450mm and 2900mm respectively. Map of the study area shows (Fig. 1).More than 94% human population are engagedin agricultural activities like producing crops, rearing animals and practicing honey bee production. They are mainly producing major crops like maize, wheat, barley, teff and sorghum and the perennial crops like coffee as well as enset (falls banana) are common crops in the area. The leftover of field crops mainly utilized and scavenging by local chickens which ultimately being used as source animal protein.

Sample size determination and selection of householdsin study area

The two study districts namely Uraga and Ana-sora were selected from 14 districts including two town namely kebri mengist and Negele borna found in Guji zone of Oromia National Reginal State. Districts including the kebels were chosen based on purposive sampling methods. In total of 4 kebeles were selected in which two of them from each district to represent the population in in the study area. The study were carried out by using structured questionnaires and those structured questionnaires were pre-tested in selected kebels. The agriculture development agents were involved in data collection through briefing the objectives of the study before survey data collected. In the study areas 48 individual households were selected that kept only two and/or more than two local matured chickens(hen and/or cock). Moreover, each of the selected farmers were interviewed to describe the family history of the flock. Total 244 matured local chickens in which 203 and 41female and male were involved for both qualitative and quantitative phenotypic parameters and only unrelated adult birds were sampled for the recording.

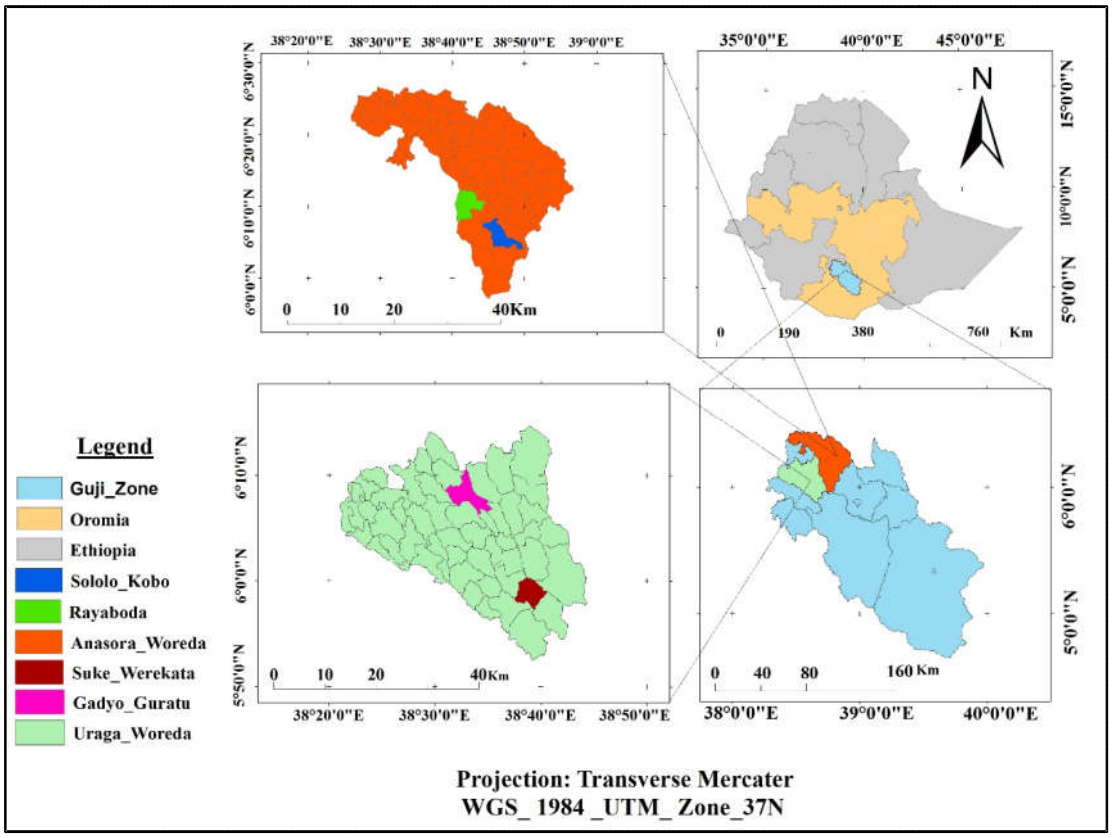

Figure 1. Map of the study areas

Household characteristics	Study areas				Grand mean
	GG (N=12)	SW (N=12)	RB(N=12)	SK (N=12)	
Sex of respondent male	83.3	100	83.3	83.3	87.5
frequency (%) female	16.7	0	16.7	16.7	12.5
Education status of respondents					
Illiterate	2	1	7	5	31.3
Reads and write	0	0	0	1	2.08
1-4	0	5	1	0	12.5
5-8	7	5	2	4	37.5
9-12	1	1	2	2	12.5
10+1	1	0	0	0	2.08
10+3	1	0	0	0	2.08
total	12	12	12	12	48 (100)
Sex with age (year)					Over all mean ± SD
Male <14	2.33±1.22	3.00±1.95	2.11±.93	2.89±2.26	2.62±1.67
Female <14	2.44±1.50	3.50±2.17	1.89±.93	3.16±1.83	2.74±1.72
Male 15-30	1.90±1.50	1.78±1.09	1.57±1.13	2.30±1.49	1.92±1.32
Female 15-30	1.71±.75	1.41±.99	1.75±1.16	1.66±1.00	1.61±.96
Male 31-60	1.29±.75	1.00±.00	1.57±1.51	1.00±0.00	1.25±.89
female 31-60	1.62±1.76	1.50±1.00	1.43±1.13	1.13±1.12	1.41±1.15
Male >60	1.00±.00	Null	Null	1.33±.58	1.25±.50
Female>60	Null	Null	1.00±.00	1.00±.00	1.00±.00

GG=Gadio Guratoo, SW=Sukie worketa, RB=Raya Boda, SK=Sololo kobo

Table 2. Livestock ranking based on importance index in the study area

Species domestic livestock	Importance level			
	1st	2nd	3rd	index
Cattle	36	4	1	0.480
Sheep	2	14	2	0.148
goats	0	1	5	0.029
Chicken	1	13	22	0.209
horse	1	6	3	0.074
donkey	0	2	0	0.016
mule	0	0	0	0.000
camel	0	0	0	0.000
beehive	1	1	6	0.045
	41	41	39	

Indexing formula = £ (1^{st} rank * 3) + (2^{nd} rank *2) + (3^{rd} rank * 1)/1^{st}*3 +2^{nd}*2+ 3^{rd}*1

Neighboring households were skipped to avoid the risk of sampling chickens sharing the same cock. Selection thoroughly consulted key informant livestock officials from zonal, district and owners from kebelelevels (last administrative level).

Data collection and analysis

Descriptive statistics such as mean, range, frequency and percentage were analyses the data using statistical package for social sciences. List of physical descriptors were prepared to record both certain quantitative traits and qualitative morphological characters and using cross sectional questionnaire surveys, information focusing on management practices such as the provision of housing, supplementation of additional feed, poultry health management practices and marketing systems were collected from member(s) of the households directly responsible for management and care of chicken. The data were analyzed using SPSS software, version 22 (SPSS, 2016). The same software were used for quantitative variables such as body weight, shank length, shank circumferences, wing length (span) were analyses to obtain descriptive statistic GLM multivariate analysis. Indexing formula = £ (1st rank * 3) + (2nd rank *2) + (3rd rank * 1)/1st*3 +2nd*2+ 3rd*1 was applied to rank the importance of livestock in study area.

RESULTS AND DISCUSSION

Household characteristics

Household characteristics of village local chicken owners in the study area is shown in table (1) males were participated highly in response of provided questionnaires. As the result indicated that 83.3%, 100%, 83.3%, 83.3%, of male'srespondent were participated in Gadio Guratoo, Sukie Worketa Raya Boda, and Sololo Kobokebeles respectively. In all kebels females were equally participated 16.7% except Sukie Worketa which was not participated at all.

The educational level of the respondent were 31.3%, 2.08%, 12.5%, 37.5%, 12.5%, 2.08%, and 2.08% of Illiterate, Reads and write, 1-4 grade, 5-8grade, 9-12,10+1 and 10+3grade respectively. The result was completely different from (Halima 2007) report that the majority respondents were female (74.16 %) at west north Ethiopia and also (Dinka *et al.,* 2010) reported that (92.4%) accomplished by women and children households respondent atrift valley of Oromia chicken production and also other researcher report revealed that 65.7, 26.7 and 7.6% of children, wife and husband were participating in rearing the chicken in mild rift valley region of Oromia (Samson Leta and Endalew Bekana, 2010). The average number of household members with their age were indicated in same table one. This research result indicated that most of the time the women/female-headed households wereless responsible for chicken rearing in the study area. Thus that females in this particular area was under less participation in poultry production which the possible reason might be the most economic activities dominated by male who have superiority concept and/or less awareness and knowledge about the benefit of chicken rearing of females at householder level. This result shows that one can plan to push and enhance to participate females more and more in this activities and could improve their household income.

Livestock ranked based on importance index in the study area

In this study about 7 species of livestock lists with importance value were indicated in (table 2). The most important animals showed in rank index valued that 0.480 (48.0%), 0.209 (20.9%), and 0.148 (14.8%) were cattle, chicken and sheep respectively. Other than those livestock mentioned before were seated in descending order of importance in the ranking index which were horse, goats donkey and beehive respectively in study area. The result of this ranking index lead to deduce and idea about the most practical livestock rearing cattle might be most important to agrarian due to cultivate their land using

Table 3. The local chicken management practice of respondents in study area (N=48)

parameter		Study kebeles				Total respondent (N= 48)
		GG (N= 12)	SW N=12)	RB N=12)	SK (N=12)	
Scavenging (%)	yes	100.0	100.0	100.0	100.0	100.0
Watering (%)	yes	100.0	100.0	100.0	100.0	100.0
Culling (%)	yes	100.0	100.0	100.0	100.0	100.0
Selecting cock for breeding (%)	yes	91.7	100.0	100.0	100.0	97.9
	no	8.3	0.0	0.0	0.0	2.1
Selectin hens for breeding (%)	yes	100.0	100.0	100.0	100.0	100.0
Disease occurrences (%)	yes	66.7	50.0	58.3	54.5	57.4
	no	33.3	50.0	41.7	45.5	42.6
Diseased birds' treatment (%)	yes	1.94	0.56	1.32	2.40	6.22
	no	98.06	99.44	98.68	97.6	93.8
total		100.0	100.0	100.0	100.0	100.0
Provision of modern treatment		0.84	0.0	0.48	0.0	1.32
Traditional medication practice		1.12	0.56	0.84	2.40	4.92
Supplements (%)	Yes	100.0	100.0	100.0	100.0	100.0
Kind of supplements (%)	grains	25.0	0.0	8.3	0.0%	8.3
	Grain crop residue	33.3	0.0	25.0	8.3	16.7
	Grain+ leftover	25.0	75.0	33.3	83.3	54.2
	Grain leftover +crop residue	16.7	8.3	33.3	8.3	16.7
	Grain+ leftover +crop residue +vegetable++oilseed	0.0	8.3	0.0	0.0	2.1
	Grain+ leftover +crop residue +vegetable	0.0%	8.3%	0.0%	0.0%	2.1
Market problems	yes	66.7	41.7	58.3	8.3	43.8
	no	33.3	58.3	41.7	91.7	56.3

GG = Gadio Guratoo, SW= Sukie Worketa, RB= Raya Boda, SK=Sololo Kobo,TO = Total Observation

Table 4. Cross tabulation result on material used for construction of chicken house in the study area

Part of house	Material used %	Study area				
		Gadio Guratoo	Sukie worketa	Wood Raya	Sololo kobo	Present of total
		9	10	9	7	count 35 (N)
Roof	Grass/bush	0.0	0.0	44.4	57.1	22.9
	wood	55.6	100.0	22.2	14.3	51.4
	Wood+mud	0.0	0.0	11.1	28.6	8.6
	bambo	33.3	0.0	22.2	0.0	14.3
	Bamboo+grass	11.1	0.0	0.0	0.0	2.9
Count9	10 8 6	33				
wall	wood	11.1	90.0	37.5	100.0	57.6
	mud	11.1	0.0	12.5	0.0	6.1
	Wood+mud	33.3	10.0	12.5	0.0	15.2
	bambo	33.3	0.0	37.5	0.0	18.2
	wood +bamboo	11.1	0.0	0.0	0.0	3.0
floor	wood	8	10	7	8	33
		62.5	40.0	42.9	62.5	51.5
	Mud	12.5	50.0	14.3	25.0	27.3
	Wood+mud	12.5	10.0	0.0%	12.5	9.1
	Bamboo	12.5	0.0	42.9	0.0	12.1

Table 5. Show the Results of qualitative trait local chicken in study area of Guji (N=240)

Qualitative parameters			Study kebels				Total observation 240 (N)
			Gadio Guratoo	Sukie worketa	Raya boda	Sololo kobo	
			(N= 60)	(N=58)	(N=61)	(N=61)	
Combsize (%)	small	1	80.0	72.4	73.8	59.0	71.3
	Medium	2	1.7	10.3	11.5	21.3	11.2
	large	3	18.3	17.2	14.8	19.7	17.5
Ear lob		yes	95.1	100.	100.0	100.0	98.8
		no	4.9	0.0	0.0	0.0	1.2
Super present		yes	24.6	21.7	26.2	51.6	31.1
total		no	75.4	78.3	73.8	48.	68.9
Shank feather		yes	00.0	00.0	00.0	00.0	00.0
		no	100.0	100.0	100.0	100.0	100.0
Feather distribution		normal	93.4	86.7	95.1	82.3	89.3
		Feather	6.6	13.3	4.9	17.7	10.7

Table 6. Shows the Color patterns and plumage of local chicken in study area of guji

Qualitative parameters		Study kebels				Total observation 240
		Gadio Guratoo (N= 60)	Sukie worketa (N=58)	Raya boda (N=61)	Sololo kobo (N=61)	
Plumage pattern of neck	plain	23.0	15.5	18.2	8.9	16.5
	Barred/auosomal	0.0	8.6	0.0	1.8	2.6
	barred	18.0	13.8	18.2	17.9	17.0
	Laced/single	3.3	1.7	20.0	7.1	7.8
	mottled	54.1	60.3	43.6	64.3	55.7
Plumage pattern of body	plain	23.0	13.3	16.4	8.1	15.2
	Barred/auosomal	0.0	10.0	0.0	1.6	2.9
	Barred	16.4	11.7	19.7	22.6	17.6
	Laced/single4	4.9	1.7	3.3	3.2	3.3
	mottled	54.1	63.3	60.7	64.5	60.7
	spangled	1.6	0.0	0.0	0.0	0.4
Plumage pattern of tail	plain	31.1	13.3	21.3	8.1	18.4
	Barredauosomal	0.0	8.3	0.0	1.6	2.5
	barred	14.8	13.3	18.0	22.6	17.2
	Laced/single	1.6	1.7	4.9	3.2	2.9
	mottled	50.8	63.3	55.7	64.5	58.0
	spangled	1.6	0.0	0.0	0.0	0.4
Ear lobe color	Non pigment(1)	15.5	18.3	13.3	8.2	13.8
	Red (2)	31.0	25.0	43.3	59.0	39.7
	White and red(3	51.7	56.7	43.3	29.5	45.2
	Red and yellew4	1.7	0.0	0.0	0.0	0.4
	other	0.0	0.0	0.0	3.3	0.8
total		100.0	100.0	100.0	100.0	100.0
Eye color	Amber	0.0	6.7	10.0	16.1	8.2
	golden-brown	27.9	55.0	46.7	33.9	40.7
	sunburst	70.5	28.3	36.7	21.0	39.1
	Flamed iris	1.6	10.0	6.7	29.0	11.9
Shank color	white 1	23.0	21.7	29.5	19.4	23.4
	blue 3	65.6	70.0	52.5	58.1	61.5
	black with white sole 5	11.5	8.3	18.0	22.6	15.2
total		100.0	100.0	100.0	100.0	100.0

Color and plumage of patterns Descriptors listed Based on FAO (2011)guideline

them and local indigenous chickens usually practice in an area of crop-livestock mix farming system that become 2nd to cattle in ranking of Importance. Average mean number of animal species owned by respondents were 5.9, 3.7, 3.7, 10.3, 1 and 2 for Cattle, Sheep, goats, chickens, donkeys and horses respectively. Therefore this result shows that chicken rearing was most important activities to generate household incomes readily in study area. But camel and mules are zero valued in the result this might be influenced by different limiting factors such as number of respondent limitation and/or by chance respondents those involved in the study area might not have those animals but other people which not involved in study might have tell their importance's if they might got chance in huge number participating to this kind of interviews so that the result might be different from this one. Thus need more and depth research including wider area with more number samples coverage.

The local chicken management practice of respondents in study area

The management practices parameters of the respondents were listed in the (table 3).Production system of the study area was comprises 97.2% crop-livestock and 2.1% pastoralist. The major occupation of the study area was 44 (91.7%) agriculture, 2 (4.2%) trade and 1(2.1%) teaching respectively. The rearing systems of chicken in the area was more or less scavenging system which supplemented with little feed. This result supported by (Ngussie 2010 and Bogale 2008) revealed that in different area of the country rearing chicken were in scavenging system. All chicken owners provide supplementary feed and practicing watering of 100%.All interviewed owners were practicing 100% supplement their birds with different kind of sources which is consist ant with the result found in Mid Rift Valley of Oromia region reported by (Samson Leta and Endalew Bekana, 2010) that (94%) of Chicken production system managed mainly on scavenging with conditional feed supplementation. proportion of supplementation were 8.3%, 16.7%, 54.2%, 16.7% , 2.1%, 2.1% of whole grains, Grain crop residue, Grain + leftover, Grain +leftover +crop residue, Grain + leftover +crop residue + vegetable + oilseed and Grain+ leftover + crop residue + vegetable respectively. The provision of 54.2% and 16.7% of Grain + leftover and Grain crop residue are very high as compare to other source listed respectively.

Other scholars (Dinka *et al*., 2010 and Fisseha *et al*., 2010) were also reported that of both on local chicken at Rift valley of Oromia and Bure district of Amhara region revealed that the dominant (98 %) and (83%) chicken production system were extensive/traditional type of production managed mainly on scavenging with seasonal supplementation of home grown grains and household food leftovers. Other inconsistent results by (Worku *et al*. 2012) which was reported that of 82.7% of supplement purchased from market 2.6% from farm and from both farm produced and market 10.2% source supplement. Water was provided during the dry season (86.2%), rainy season (3.6%) and year round (10.2%) and also find similarity with the works of (Moges *et al*., 2010) who reported that 85.4% provide water only during the dry season and 14.3% throughout the year and different sources of water to drink their birds used like (60.2 %), pipe (21.4%), river (12.2%) and pond (6.2%) in west Amhara region. The possible reason for this result might be due to easily available crop residue and some leftover food refusal from family consumption and access water in the study area.

Thus Indigenous chickens are excellent foragers required few supplement only at feed shortage time. Owner of chicken's have practice of Culling and selecting hens for breeding and also selecting cock for breeding were 97.9% and 93.8% respectively. Selection for breeding usually based on growth rate, large body size, high egg production, hatchability and good mothering ability. Chickens owners in the study were experienced with incidences of disease problem 57.4% and treating diseased chickens were 1.32% and 4.92% with modern and traditional treatment respectively. Similarly (Fessha M., *etal*, 2010) was reported that 97.5% of chicken owners experienced chicken disease problems, mainly Newcastle disease 98.2%and that 95% of village chicken owners used only traditional means to treat sick birdsat bure district. The critical constraints of scavenging chicken production at North wollo were disease (60.13%) predators (20.59%) and feed shortage (19.28%)(Addisu Hailu, 2012) and in good agreement with the reports of(Worku Z. etal. 2012)97.6% and 2.40% of predators and disease incidences respectively. Andin addition (Tadelle D, 2003) reported that Ethiopian chicken rearing system were characterized by extensive scavenging management, no immunization programs, increased risk of exposure of birds to disease and predators. These results indicated that the prevention through treatment is by far less than compared to chance of disease occurrences in the study area. This is might be due low educational Level of the respond which already have seen in previous household characteristic discussion.

Market problems of the study area was assessed and indicated in (table 3). Thus 43.8% of respondent have market problems while 56.3% of respondents reacted no have market problems in general. The possible reason for market problems might be listed a lot but the study area situated long distance away from city dwellers and less possible market access to the main road goes to city more over people found in that study area might have other alternative of animal protein source with best preference in test and/or price but to be more justifiable on fact it required research on consumption and market assessment in the study area. Cross tabulation result on material used for construction of indigenous chicken house and house parts in the study area were showed in (Table 4).

The number and percentage of each location was not equal since some value is missing. Parts of house subjected to this study were Roof, wall and floor which were made of 51.4%of wood, 22.9%of grass/bush, 14.3% of (wood+mud) 8.6% of (bamboo),and 2.9%of(bamboo+grass). Wallswere made from 57.6%, 18.2%, 15.2%, and 6.1% and 3% of (wood), (banbo), (wood+mud) and (wood+bamboo) respectively. While floor were made from 51.5%, 27.3%, 12.1%, 9.1% of(wood), (mud), (Mud), (bamboo) and (wood +mud)respectively. The result is inconsistent with the report of (Worku Z. *etal*. 2012) which was much less 12 % of households construct separate poultry houses for their chickens. The result indicate that the area were experienced constructing separate house Andrich with different ample resources of wood, Mud, Bamboo and grasses which have considerable value to construct most parts of the chicken houses in the study area. This is more or less similar experiences used and practices in other parts of the country. In addition, the materials were easily manipulated by the knowledge of indigenous people in the study area. In conclusion, the study indicated that the productivity of the village chickens was found to be very low and thus calls for appropriate interventions to be undertaken which should focus

on the improvement of feeding, housing, breeding and health care of local chickens. And more over there is a need to design and implement a research programmer in order to improve their productivity.

The Results of qualitative trait local chicken in the study area of Guji

The number of and percentage of each levels of quantitative traits that is comb size percent, ear lobe, super present, shank feather present were analyzed and their value showed in (table 5). As the univariate analysis indicted that there were little difference observed between the areas. From total observation 240 (N) the comb size presents were 71.3%, 11.2%, and 17.5% were small, medium and large consecutively. Local chicken population in study have exhibited value comprises 98.8%, 68.9%, and 100% of ear-lob, super, and shank feather respectively. The feather morphology was dominantly 89.3% normal and 10.7 % feathered. The color patterns and plumage colors subjected to this study were neck, body and tail were dominated by 55.7%, 60.7%, and 58% of (mottled) respectively followed by 16.5% (barred) and 17% of (plain).Ear lobe color was dominated with 45.2% white and red, 39.2% red, and 13.8% non-pigmented while Eye color was dominated by 42.2% golden, 31.7% sunburst, and11.9 % flamed colored.

Shank color 61.5% blue and 23.5% white while other colors were very small in proportion as compare to the dominant one in chicken population. This study got different as compared with Eskindir (2013) reported that different in Chickens predominantly have brown mottled plumage color, 20.27% and 21.10% in Horro and Jarso districts respectively and also the same author showed that a complete body red plumage is typical of 17.12% and 15.60% of chickens from Horro and Jarso districts respectively. Other side of the country reported by (Haile Michael*etal.*2015) Plumage colors were 24.17% red followed by 13.33% white and13.06%black in local population of Southern Zone of Tigray. Plumage pattern of neck, body, and tail of Chicken in this area have dominantly 55. %, 60.7% and 58% (mottled) respectively. Also five. Four and three type of colors of ear-lob, eye and shank were observed respectively. The eye and shank colors were dominant 40.7% (golden-brown) and 61.5 % (blue).Supportive results were reported by (Eskindir et al, 2013) that revealed orange eye color (wild-type color) was found in higher frequency in Horro than Jarso district (87.84% vs 72.48%) and it was followed by the red, largely more represented in Jarso (24.31%) than in Horro (9.01%).other scholars by (Ngussie *etal*. 2010., Bogal 2008 and Haile Michael et al 2015)ear-lob colors were reported 40% white, 52 % red, 8%yellow and 26% white and 74%white and red Yellow, (50.55%), followed by white (38.89%) and black (10.56%) and (40.28%) of chicken population exhibited white and red earlobe, followed by red (28.89%), white (26.94%) and yellow (3.89%) their study area. Respectively.

The quantitative trait measurement value of local chicken in study are of Guji Zone

The mean separation with standard errors of the chicken numbers were listed in (table 7). Young chickens, pullet's cockerels, ands and cocks were analyzed average mean values and standard deviation. Each group of population value were observed. The average flock size per household was (18.5±1.97) greater than average population number of 13 chicken's population per household thatwas reported by (Samson Leta and Endalew Bekana, 2010) at mild refit valley region of Oromia and moreover reported by (Dinka H. etal., 2010) was that 13 chickens per household (i.e., 12 local chickens and one exotic chicken per household).and It is comparable with the country average flock size under rural chicken production system ranges from 7 – 10 birds in each household consisting of 2 – 4 adult hens, one cock and some growers of different age groups (CSA, 2015) and similarly supportive result was founded by (Fisseha M. etal., 2010) reported that average flock size per household 13 (ranged 1 - 57), with a hen to cock ratio of 3.7:1 at bure local chicken ecotype in Amhara region. However, the data from the survey revealed a much higher ratio of 1:3.2.Population of young chicks were highest in umber (7.0± .70) followed by pullets (3.5 ±.33), hens (3.4 ±.3, cockerels (2.5 ±.32) and cocks (2.1± .30) per household respectively. The recommended cock to hen ratio is 1:10. However, the ratio of female to male was nearly 2:1 that much greater than the recommended one in study area and higher than reported by (Tadelle *et al*. 2003b and Bogal Kibret, 2008) i.e. 2.5:1 and 1:3.21 That ratio of hen to cock were found in the Central Highlands of Ethiopia and in Fogera woreda respectively. This result have shown high flock size of male might be done to market demand for different ceremonial occasion that lead to reared male in the study area.

Least square means ± SE of quantitative traits of cocks' and hens. (p<0.05)

Least square means ± SE of quantitative traits of cocks' and hens in the study area were tabulated in (table 8). There were no significant different at (p<0.05) between location or sites whichwas average body weight (ABW) range 1.6 -1.7kg, 4.0-4.1 cm shank circumference (SC)and super length of chicken1.0-1.2cm (SUL).The average mean values of all parameters except average body weight and Super Length were significantly different at (P<0.05) level between location. GGand SK chicken was not significantly different in average body length of 40.2±0.40 cm and 41.0±0.40cm respectively. Whereas, other locations were resulted significantly greater value at (p<0.05) level41.7±0.41 and 41.7±0.40 (ABL) (cm). The wing span top and (WST) 45.8±0.0.46cm SW was greater than 44.1±0.44cm and 43.8±0.44cm values of both Raya boda and sololo kobo while GG chicken wing span of top was shorter than others quantitative traits.

SW chicken have greater wing span bottom (WSB) 47.3±0.45 cm than other location which have equal value 44.8±0.43cm, 45.43±0.43 cm and 45.8±0.0.43cm of (WSB) were significantly greater at (p<0.05) levels. Chest Circumference (CC) 30±0.33cm value of SW was significantly greater from other location 9.20.11cm, 9.00.11cm, and 9.20.11cm values which significant differed between each other at (P<0.05)level. Shank Length (SL) values 9.20.11cm, 9.00.11cm, and 9.20.11cmof SW, RB, and SK were significantly greater than GG 8.00.11cm (SL) of chicken in the area respectively. The possible reason of this variation is due to influence of genetic and environmental factors that exposed to chickens in the study area. All this qualitative traits variations could be used as source of selection for improving the chickens of study area and positively affect breeding program in the future. Quantitative traits between sex were evaluated with Least square means ± SE values of significantly greater value at (p<0.05) level 2.1±0.05kgand 1.5±0.02average body weight (ABW) male and female respectively. This more or less agree with the result of (Addis Hailu 2012) revealed that overall

mean body weight of indigenous male and female chickens at North-wollo were 1500.97gm (1.5kg) and 1253.36 gm (1.3kg) respectively and by (Haile Michael*etal.*2015) reported that the mean body weight of indigenous male and female chickens was 1271±12.6g and 1034±8.05g, respectively in Tigray region. Other scholar conducted research in local chickens at fogera worda reported that average weight of hens was 1.21 kg (Bogal Kibret 2008). Other parameters like43.4±0.36cm (ABL), 47.4±0.40cm (WST) 49.4± 0.39cm (WSB), 31.30.29cm (CC), 9.7±0.10cm (SL), and4.3±0.05cm (SC) oncock (male) than value 1.5±0.02kg (ABW), 38.9±0.17cm (ABL), (WST) 40.7±0.19cm (WSB), 42.4±0.40cm (CC), 27.40.13cm (SL), 8.0±0.05cm (SC) of hen/female) were observed. Super length 1.3±0.09cm and 0.8±0.24cm was not significant different between hen and cock respectively. Weight and other quantitative measurements expiated above might be affected by gen and environmental interaction. It is obviously known that environment and gen interaction have great role on performance and adaptability of livestock.

Performances trait value of local hens under farmers' management condition

Performances trait value of local hens under farmer's management condition were indicated in (table 9).Individual Local hens has laid16.23±.56 eggs per single clutch and achieved 12.56±.61of chicks were hatched which is similar results reported eggs incubated using a broody hen varied from 7-15 (Samson Leta and Endalew Bekana, 2010) at mild refit valley region of Oromia. Other Comparable result 12-13 egg/clutch was reported by (Bogale, 2008) at south Gondar fogera district of local chickens. The average number of eggs produced / hen/year was 79.09±4.52 which was greater than other reports 34 and 37.5 egg/year/hen by (Brannang and S. Person, 1990, and fisseh. et al., 2010) in all Ethiopian and North West Ethiopia respectively and (Fisseha M. *etal*. 2010b) on his report partrevealed that 53-60 egg/hen/year at bure North-West Ethiopia.

Table 7. Average chicken flock size in the study area (N=48)

Parameter	Study kebels				Overall
	Gadio Guratoo Sukie worketa (Uraga) district		Raya boda (Anasora) district	Sololo kobo	Mean ± SE
Young chicks	3.6 ±.75	11.4 ± 1.44	6.9 ±.94	5.2 ± .03	7.0± .70
pullets	3.8 ±.37	3.6 ± .91	3.3± .65	3.6+ .50	3.5 ±.33
cockerels	1.7 ±.81	3.9 ±.45	2.7± .58	1.8±.70	2.5 ±.32
hens	2.9 ±.59	4.4 ± .82	3.3 ± .62	2.9 ± .38	3.4±.32
cocks	1.5 ±.40	2.1 ± .38	1.6 ± .26	3.0± 1.02	2.1± .30
Total flock size	13.5±2.92	25.4±4.03	17.8±3.03	16.5±2.63	18.5±1.97

Table 8. Least square means ± SE of quantitative traits of cocks' and hens in the study area of Guji. (p<0.05)

Study areas	Quantitative traits							
	ABW (kg)	ABL (cm)	WST (cm)	WSB (cm)	CC (cm)	SL (cm)	SC (cm)	SUL (cm)
location	Ns	***	***	***	***	***	NS	NS
GG (N=61)	1.6±0.05	40.2±0.40^{a}	42.7±0.44^{a}	44.8±0.43^{ac}	29.4±0.32^{ab}	8.00.11^{a}	4.0±0.06	1.0±0.27
SW (N=60)	1.7±0.05	41.7±0.41^{b}	45.8±0.0.46^{b}	47.3±0.45^{b}	30±0.33^{b}	9.20.11^{b}	4.10.11	1.0±0.21
RB (N=61)	1.6 ± 0.05	41.7±0.40^{b}	44.1±0.44^{c}	45.43±0.43^{c}	29±0.32^{a}	9.00.11^{b}	4.10.06	1.2±0.29
SK (N=62)	1.6 ±0.02	41.0±0.40^{a,b}	43.8±0.44^{c}	45.8±0.0.43^{c}	29±0.07^{ab}	9.20.11^{b}	4.10.06	1.0±0.21
Sex	***	***	***	***	***	***	**	NS
M (N=43)	2.1±0.05	43.4±0.36	47.4±0.40	49.4± 0.39	31.30.29	9.7±0.10	4.3±0.05	1.3±0.09
Fe (N=201)	1.5±0.02	38.9±0.17	40.7±0.19	42.4±0.40	27.40.13	8.0±0.05	3.8±0.02	0.8±0.24
Over all Mean	1.6 ± 0.02	41.1 ±0.20	44.1±0.12	45.9±0.22	29.4±0.16	8.8±0.06	4.1±0.29	1.0±0.13

- The mean difference is significant at 0.05 level, NS = non-significant at 0.05 level, within main effect means with different subscripts are significantly different
- ABW= Average Body Weight, ABL= Average Body Length, WST= Wing Span Top, WSB=Wing Span Bottom, CC= Chest Circumference, SL= Shank Length, SC=Shank Circumference, SUL=Super Length.
- GG = Gadio Guratoo, SW = Sukie worketa , RB = Raya boda, SK= S.ololo kobo.

Table 9. Performances trait value of local hens under farmers' management condition in study area

Variables (in mean average)	Study area/ wordas)		Total means ± SE
	Uraga	Anasora	
number of eggs laid/single clutch period	15.79±.75	16.67±.85	16.23±.56
Number of chicks hatched/time/hen	11.79±.80	13.33±.92	12.56±.61
Number of chicks surviving to adulthood	7.21±.59	6.33±.63	6.77±.43
Hatchability percentage (%)	74.5%	79,9%	77.9%
Survival percentage (%)	61.2%	47.5%	53.7%
sexual maturity of male	6.42± .30	5.50 ±.24	5.98 ± 20
sexual maturity of female	6.42±.35	5.50±.24	5.98±.20
age at first egg production (month)	6.17±.29	5.91±.23	6.04±.17
Number eggs produced/hen/year	71.67±5.65	87.19±6.89	79.09±4.52
Broodiness interval average (weeks)	7.79±1.08	4.130±.55	6.00±.66
Number of hatches/ year/hen	2.75±.19	2.8333±.19	2.79±.13
marketable age of male chicken	9.04±.63	9.33±.53	9.19±.41
marketable age of female	8.38±.50	7.68±.41	8.02±.32

Table 10. Show Pearson Correlations of Body Weight and Other Linear Body Measurements ofthe study area

Variables	BW (kg)	BL (cm)	SL (cm)	SC (cm)	SHL (cm)	CS (cm)	WB (cm)	WT (cm)
BW (kg)		1 .674**	.208	.546**	.612**	.725**	.718**	.587**
BL (cm)		1	.093	.542**	.611**	.609**	.775**	.686**
SL (cm)			1	.350*	-.155	.243	.037	.008
SC (cm)				1	.505**	.522**	.538**	.469**
SHL (cm)					1	.525**	.701**	.635**
CS (cm)						1	.650**	.602**
WB (cm)							1	.837**
WT (cm)								1

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). ABW= Average Body Weight, ABL= Average Body Length, WST= Wing Span Top, WSB=Wing Span Bottom, CC= Chest Circumference, SL= Shank Length, SC=Shank Circumference, SUL=Super Length.

In addition this result was agreed with (Bushra, 2012) reported that egg produced 40 to 60 eggs / birds /year on Ethiopian local chicken. The average numbers of eggs set to incubate per hen represented 77.9% of the eggs laid per clutch. Result was agreed with result reported by (Fisseha *et al.,* 2010 and Worku et al., 2012) he average hatchability performance of local broody hens, 81.7%of eggs hatched at Bure District and 79.1% of eggs hatched at West Amhara Region of Ethiopia respectively. However, the survival rate of hatched chicks to age of sexually matured was53.7% whichis high chick mortality that at young stage. This result also agreed with (Fisseha *et al.,* 2010 and Worku *et al.* 2012) which However, survivability of young chicks, up to grower age, was attained only 60.5% and 58.3 % atbure district and West Amhara Region respectively. Male and female chickens' were reached to sexual maturity at equal time 5.98 ± 20 months. Hens start to lay eggs at 6.04±.17 months which is required slightly greater time than time of sexual maturity. Similarly consistent with (Halima M. 2007)reported that was indigenous chickens reached the first egg production stage from 144 to 168 days and Addisu Hailu (2012) was reported that the overall age at sexual maturity were 24.25 ± 0.04 and 23.84 ± 0.05 weeks at North wollo for male and female chickens respectively and also other comparable findings of (Worku Z. etal. 2012) revealed that age at first egg and at sexual maturity (male) of village chickens at west Amhara region were 6.6 and 6.1 months, respectively.

High hatchability performance of local hens (77.9%) and high mortality of young chicks (53.7%) were the two contradictory characteristics of the existing village chicken production system at study in study area. According to (Mekonnen, G., 2007) report that productivity of indigenous chicken is low due to genetic and no-genetic factors like poor management of feeding, housing and health care. The hatches frequency per year per hen was2.79±.13 that (nearly 3 times per year). The marketable age of chickens were observed significant different with sex. Average ages of female was reach faster for market than males average age values 8.02±.32 and 9.19±.41 months respectively. As the result revealed that people in the study area went to sell their chickens late after sexual maturity of chickens were attained. This give chance to replace themselves in the same area and secure continues production in household level with readily available work force too.

Correlations of Body Weight and Other Linear Body Measurements

Live body weight was positively correlated (r=.59, 72, .67, .73, .61, 55, P <0.01) with Wing span top, Wing span under, Body length, Chest circumference, Shank length, and Shank circumference respectively.

This result agreed with repot of (Addis Getu *et al.* 2014) which revealed that relationship of body weight with other body measurements for ecotype chicken in North Gondar in both sexes were highly significant (r = 0.67, P< 0.01) and Some traits like wingspan, body length and super length (r = 0.64, P < 0.01) for males and for females (r = 0.59, P < 0.01) of necked neck chickens were significantly correlated with body weight Live weight was positively correlated (r = 55.5, P < 0.01) with wingspan, Body length and super Length in Necked neck male were positively correlated (r = 0.62, P < 0.01) and females (r = 0.55, P < 0.01) whereas wing length (WL) was highest correlated trait (r = 0.67, P < 0.01). With body weight of male of indigenous Chicken Ecotypes in NorthGondar Zone. Contrarily the correlation between live body weight is not significantly correlated (r=.21, p>0.01) with Spur length in study area. The high correlation coefficients between body weight and other body measurements (P<0.01) helped to predicting live body weight of chickens. Thus as the comparable parameters correlated positively can be interpreted it's increasing or decreasing value along same way to body weight.

Conclusion and recommendation

The indigenous chicken populations founded in study area showed heterogeneity in most of qualitative and quantitative traits considered. All this observed variation and variability might use as sources of raw material for further detailed research of molecular and DNA level of separation from other relative chicken found in the country. Thus, on-farm monitoring supported with an in-depth molecular evaluation should beundertaken to prove the level of genetic differentiation and relationships among this indigenous chickenpopulations and the study result should be supported by in depth on station study for performance evaluation of local chickens hence this study were conducted under scavenging feed resource-basedproduction systems no gives optimum potential of their performances. Indigenous chicken populationsmight possess useful genetic potentials for improved productivity though improving husbandry practice and services like health, husbandry, research, extension, training and credit interventions and much more need of excreting efforts on improving productivity through selection as well as securing community based conservation and sustainable utilization of indigenous local chicken in the study area.

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