Vol.11(12), pp. 248-259 December 2019
DOI: 10.5897/JAERD2019.1046
Articles Number: D80B25762430
ISSN: 2141-2170

http://www.academicjournals.org/JAERD

ACADEMIC JOURNALS

Journal of Agricultural Extension and Rural Development

Full Length Research Paper

Assessment on rural poultry production and marketing system of Horro chicken ecotypes in Western Ethiopia

Demissu Hundie[1*], Gebeyehu Goshu[2], Berhan Tamir[2] and Gemeda Duguma[1]

[1]Department of Animal Science, Faculty of Agriculture, Wollega University, P. O. Box 395, Nekemte, Ethiopia.
[2]Department of Animal Production, College of Veterinary Medicine and Agriculture, Addis Ababa University, P. O. Box 34, Bishoftu, Ethiopia.

Received 11 March, 2019; Accepted 19 June, 2019

A cross-sectional study was conducted to assess production and marketing system of Horro chicken ecotypes, and to determine poultry health and marketing constraints across different agro-ecologies of western Ethiopia. A total of 360 householders were interviewed for the survey in Horro area (western Ethiopia) where the Horro chicken ecotypes are mainly found; the sample size was determined using proportionate sampling technique. Household characteristics studied indicated that 87.45% household heads were males and about 90.32% of householders' age group were between 20 and 60 years. Household heads whose ages lie below 20 and above 60 yrs were very small (9.68%). The low proportion of these age group might be because of the age category below 20 yrs and above 60 yrs are age groups before marriage and after retirement, respectively. The mean and standard deviation of the family size of the study area was 6.19±2.16; where a mixed crop-livestock production system was the main stay in the area. Agricultural landholding ranges between 0 and 10 hectares and per-household landholding was 1.68±1.50. The mean per household landholding in the highland agro-ecology is 2.36 ±1.59; however, the mean chicken flock size was the least. The large per household landholding at highland matches the largest mean cattle herd size (10.64 ± 4.93) as opposed to chicken flock size. This might be because of the use of cattle for cropland preparation. About 90.85% producers rear chickens for sale, which was for an immediate income generation and savings. Horro chickens in addition to low productive performance were constrained with poor housing (where only 7% of producers had separate poultry houses), insufficient feed supplement and poor health management. Chickens were exclusively scavenging for feed and about 83.82% of poultry producers interviewed responded that they were not satisfied with veterinary services delivery.

Key words: Agro-ecology, chicken-ecotypes, Ethiopia, Horro chicken, traditional-management.

INTRODUCTION

Human population in 2050 is estimated to be 7.96–10.46 billion (UNPD, 2008). Protein shortages is a well-known problem in Africa, and poultry is by far the largest group of livestock species contributing about 30% of all animal proteins consumed in the world (AGRA, 2014). The world poultry population has been estimated to be about 16.2

*Corresponding author. E-mail: dhundie@yahoo.com. Tel: 251 917 81 88 91.

billion, out of which 71.6% were found in developing countries, producing 67, 718,544 metric tons of chicken meat and 57,861,747 metric tons of hen eggs (Gueye, 2003).

The impact of village chickens in the national economy of developing countries and its role in improving the nutritional status, income, food security and livelihood of many smallholders is significant owing to its low cost of production and plays a complementary role in agriculture (FAO, 1997; Gondwe, 2004; Abdelqader, 2007; Abubakar et al., 2007). In Africa, village chickens contribute over 70% of poultry products and 20% of animal protein intake (Kitalyi, 1998). In East Africa in particular, over 80% of human population live in rural areas and over 75% of these households keep indigenous chickens. Some of the characterized and designated chicken ecotypes (native chickens) of Ethiopia are; Tilili, Horro, Jarso, Tepi, Gelila, Debre-Elias, Melo-Hamusit, Gassay/ Farta, Guangua and Mecha (Halima, 2007). Ethiopia with the annual estimated production of 41,000 tones of eggs and 61,840 tones of chicken meat contributed only 0.1% share of the global production and 9.7% egg and 11.73% chicken meat of the East Africa respectively, (FAOSTAT, 2016).

Human population in Ethiopia shows an increasing trend with alarming rate that in turn increases the demand for food, especially of livestock origin (Hadera, 2002). The rural and urban population of Ethiopia is estimated to be 80.5 and 19.5%, respectively (FAO, 2016). Rural poultry in Ethiopia represents a significant part of the national economy in general and the rural economy in particular that contributes 98.5 and 99.2% of the national egg and chicken meat production, respectively (Tadelle and Ogle, 1996; Abera, 2000). However, the per household number of chicken flocks in most Ethiopian rural communities was small; constituting an average of 7-10 (Tadelle and Ogle, 2001) and average of 7.3 (Matiwos, 2013). The economic contribution of the sub-sector is not still proportional to the 60.5 mill. Chicken population in Ethiopia (CSA, 2016) is attributed to the presence of many production, reproduction and marketing constraints.

In recent years, an emerging middle-class urban society and urbanization with better income and more purchasing power has increased the demand for chicken and chicken products. This has led to the expansion of poultry production particularly within urban and peri-urban areas. Compared to performances reported on-station, village chicken productivity in the smallholder system was inefficient and it is characterized by high reproductive wastage and low productive performance (Tadelle and Ogle, 2001; Pedersen, 2002). Thus, production and productivity of the village chicken system should be improved through the type of chicken breed used, management and husbandry practices applied. This calls for designing poultry research strategy aiming at assessing the rural poultry production and marketing system, and indigenous Horro chicken ecotypes for chicken breed improvement measures to be undertaken. This research was therefore, aimed at assessing rural poultry production and marketing system, and Horro chicken's production and health constraints under traditional management.

MATERIALS AND METHODS

Description of the study area

The study was conducted in Horro Guduru Wollega, East Wollega and West Shewa zones of western Oromia Region of Ethiopia, where the Horro ecotypes chickens are mainly distributed. The study area was selected considering agro-ecology, socio-economic importance of chicken production and population of indigenous Horro chickens based on the atlas published jointly by IFPRI and CSA (2016) and Dana (2010). The Livestock population (in millions) of the three zones was about 3.7 cattle; 1.4 sheep; 0.7 goats; 0.7 equine and 3.5 chickens (CSA, 2016). The study area is situated within the geographical coordinates between 08°29´N and 37°49´E, and at altitude range of approximately 667 - 2602 m.a.sl., where a mixed crop-livestock agriculture was the main stay. The area experiences an extended rainy season, which frequently begins in March and extends to mid-October with annual rainfall ranging from 1500-1800 mm per annum; the monthly mean temperature varies between 11.5 to 27.5°C, the average humidity varies between 49-89% (Olana, 2006).

Sampling method and sample size determination

Three districts namely Horro, Leka-Dulecha and Bako-Tibe were selected from three zones of western Oromia, in Ethiopia. The districts represented three agro-ecologies namely [Highland, Mid-altitude and Lowland] for the characterization of poultry production and marketing system. The three zones namely (Horro Guduru Wollega, East Wollega and West Shewa zones) were purposively selected for the study as the zones share many social, cultural, and livestock and agricultural product marketing. The area was classified into climatically homogenous strata. Based on the traditional method of classification, the lowlands lie between 500 to 1,500 m a.s.l and have temperature range of 20 to 27.5°C, midland range between 1,500 to 2,300 m with a temperature range of 17.5 and 20°C. The highlands range between 2,300 to 3,200 m, and within temperature range of 11.5 to 16.0°C. After farmers, who rear poultry were listed on a flipchart from nine 'kebeles' (the smallest administrative structure in Ethiopia) three 'kebeles' from each district, a total of 360 householders were identified for the questionnaire survey using a proportionate sampling technique (Bellhouse, 2005):

$W = [A/B] \times N_o$.

Where, A = total no of households per single selected agro-ecology.
B = Total sum of households living in sample agro-ecology and rearing chicken.
N_o = the total required calculated sample size.

Methods of data collection

Semi-structured questionnaire was prepared in English and administered in 'Afan-Oromo' (local language of the study area); 36 farmer respondents, six enumerators, zonal and district experts were selected for the questionnaire pretest. Finally household survey was conducted to collect data on general households'

Table 1. Household (HH) sex, level of education and age characteristics.

Household head characteristics	Frequency (No of HH)	Percent
Sex		
Male	271	87.45
Female	39	12.55
Level of education		
Illiterate	87	28.06
Elementary	175	56.46
High school and above	48	15.48
Age		
< 20 yrs	3	0.97
21-30 yrs	36	11.61
31-40 yrs	118	38.06
41-50 yrs	89	28.71
51-60 yrs	37	11.94
> 60 yrs	27	8.71

NB. The educational level classification was based on the current Ethiopian educational level classification where: Illiterates were those who didn't join school, Elementary schools were grade 1-8 and high school and above was for grade 9 and above.

demography, livestock composition, poultry production and marketing system employed, and chicken management, and major chicken health constraints.

Data on family's demography, land and livestock holding, educational status, family members' responsibility in poultry production and marketing and income administration were collected through interview. Data on poultry house type and housing system, flock size and structure by age, sex and breed, management system such as breeding and hatchery management, egg storage, health care, feeding and watering and technological inputs use for poultry improvement were assessed. Data on poultry health constraints, health facilities locally available, and marketing system and market constraints encountered were gathered using survey questionnaire and key informant interview. Veterinary clinical case books were referred to and veterinarians of respective districts were consulted on disease prevalence, veterinary services available and technological interventions implemented.

Statistical data analysis

Survey data were entered into Microsoft Excel program for data clearance, which then was exported to *Statistical Package for Social Sciences (SPSS) for windows, version 20.0*. Descriptive statistics was used to analyses the means, standard deviations, minimum and maximum values of the quantitative data frequencies and percentages values. For quantitative variables such as data on household family size, land holding, livestock holding, chicken flock structure, generalized linear model (GLM) in SAS version 9.3 (2014) was employed.

RESULTS

Households' characteristics and demography

Characteristics of household studied are presented in Table 1. Most of the households are headed by males; male and female headed households were 87.45 and 12.55%, respectively. Level of literacy indicated that, most households (56.46%) interviewed had elementary education followed by illiterates (28.06%), and only 15.48% of households attended high school and above. The major age group (90.32%) of rural households of the study area lies in between 20 and 60 years; the households whose age was under 20 and above 60 years were few which was only 9.68%. Even though the households in the study area were mainly male headed, women play a significant role in poultry husbandry than their men counterparts. Very small number of young households (< 20yrs age) and old (>60yrs) participate in poultry production, which might be because, this age groups respectively, are the ages before marriage and after retirement from major agricultural activities.

Cropland and livestock holdings

Family size, livestock population and chicken flock structure are presented in Table 2. The mean and standard deviation of the family size of the study area were 6.55 (1.99), 6.34 (2.33) and 5.77 (2.1) for Horro, Bako-Tibe and Leka-Dulecha districts, respectively. Agricultural landholding studied was mainly rain fed where landholding ranges between 0 to 10 hectares per household; the mean was largest for Horro (highland) (2.36 ±1.59) followed by Bako-Tibe (lowland) (1.51±1.63); the least was Leka-Dulecha (mid-altitude) (1.25 ± 1.06) consecutively. Cattle, sheep, goats, equines and

Table 2. Cropland, livestock holding and poultry flock structure.

Study-zones	No of HH	Family size	Cropland holding (hectar)	Livestock holding (in Number)				Poultry flock structure (in number)					
				Cattle	Sheep	Goats	Equine	Chicken	Chicks	Cockerels	Pullets	Hens	Roosters
		Mean ± Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd
Highland (Horro area)	100	6.55 (1.99)	2.36 (1.59)	10.64 (4.93)	6.73 (3.75)	2.86 (2.97)	3.19 (1.98)	10.46 (4.76)	4.63 (3.01)	0.58 (1.17)	0.88 (1.86)	3.40 (1.76)	1.36 (0.84)
Lowland (Bako area)	92	6.34 (2.33)	1.51 (1.63)	7.92 (7.44)	0.43 (1.32)	0.47 (1.99)	0.65 (.80)	13.26 (7.14)	5.59 (5.17)	1.54 (1.63)	1.53 (2.02)	3.65 (2.91)	1.01 (0.74)
Midland (Leka dulecha area)	118	5.77 (2.1)	1.25 (1.06)	6.58 (4.83)	4.30 (4.55)	0.24 (1.03)	0.78 (1.0)	10.09 (6.03)	3.06 (3.77)	0.92 (1.42)	1.70 (1.90)	3.72 (1.60)	1.13 (0.88)
Total	310	6.19 (2.16)	1.68 (1.50)	8.29 (5.99)	3.94 (4.37)	1.15 (2.41)	1.52 (1.78)	11.15 (6.16)	4.31 (4.16)	1.00 (1.46)	1.39 (1.95)	3.60 (2.12)	1.17 (0.84)

* N= number of householders interviewed.

chickens were the common domestic livestock reared in the area where cattle were the first in the rank of preference and level of importance. Chicken population had no direct relation with the mean per household landholding. This implies that area of land possessed had no effect on chicken population. It was rather the productivity of chicken that determines population. Landholding mainly cropland holding had more direct relation with cattle population as these animals were used for cropland preparation.

Chicken flock structure

The chicken flock in the study area was mainly composed of chicks followed by hens. Overall mean and standard deviation chicken flock size per household was 11.15±6.16, where the values for chicks, hens, pullets, cockerels and roosters were 4.31±4.16, 1.46±1.00, 1.95±1.39, 3.60±2.12 and 1.17±0.84, respectively. Even though the population of chickens was large and considered as important source of immediate income; they were not the first preferred livestock in order of importance compared to other livestock (Table 2). However, they are sometimes more preferred to equine and small ruminants by some rural and landless households. Chicken population, mainly the number of chicks was highly fluctuating with season of production. Producers did not let their hens to incubate during summer (wet) season of the year due to high disease prevalence during the wettest season of the year mainly from June to August and predators mainly cat-family predators and birds rob chicks during summer when they luck other preys to feed. The population of cockerels and pullets calculated from this study were 8.9 and 12.47% respectively, which implies the low survival rate of chicks produced under traditional management, and the challenge in getting hold of replacement stock.

Chickens in this study area were reared mainly for sale (90.85% producers) to generate immediate income and savings, where only 3.27 and 1.96% of them are reared for consumption and holyday sacrifices, and breeding and multiplication, respectively. The result also revealed that 29.22 and 26.95% chickens were owned by husbands and wives (as a common property) and by the whole family, respectively. The remaining 11.27, 13.31 and 17.86% chickens' ownership in particular goes to separate holding to family head, spouse and children, respectively.

Poultry keeping uses family labour in general and that of house wives in particular, who often look after and own the family flocks as major beneficiaries. Children particularly school boys and girls who are supported by their family, particularly by their mothers use the income and savings to buy school materials, clothing. Grown up children (boys and girls), who own and oversee chickens and their income by themselves use it to manage chicken, their school and other expenditure independently.

Income generation from live chicken and egg sale was the primary goal of family poultry keeping and was followed by production for savings (Table 3). Eggs can provide a regular, very small income

Table 3. Objective of poultry production and ownership characteristics.

Objective of production		Frequency	%	Rank
Consumption		10	3.27	3
Sale		278	90.85	1
Saving		12	3.92	2
Breeding		6	1.96	4
Chicken Ownership				
	Householder's	39	11.27	5
	Spouse's	41	13.31	4
	Children (Boys and Girls)	55	17.86	3
	Whole families'	83	26.95	2
	Husband and wife's	90	29.22	1
Source of initial Capital				
	Agriculture	261	87.58	1
	Private loan	10	3.35	3
	Family & friends	26	8.73	2
	Cooperative-finance	1	0.34	4

while the sale of live birds provides a more cash which can cover most home expenditures as required by house wives. The income obtained from sale of chicken was used for children's school fee, purchase of home consumptions and sometimes for purchase of agricultural inputs. The initial capital for poultry production in the study area was mainly obtained from agriculture (87.58%); gifts from family and friends, private loan and micro-finances (extension services) constitute the remaining sources.

Poultry production and management characteristics

The major feed resources, feeding practices and frequency of feed offering, and housing management assessed during this study are presented in Table 4. The predominant feeding practice in the study area was supplementation of scavenging chicken with feeds from home source, purchased grains and kitchen leftover. This result showed that 94.19% producers offer supplementary feed mainly composed of grains (46.23) obtained from farmers' home. About 73.52% of chickens in the current study area perch during night at different sites in the residence of family. Only 19.51, 3.14 and 3.83% of producers keep their chickens in kitchen, under the ceiling of living house and in baskets/cartons respectively; the remaining 7% producers constructed separate poultry house. Personal observation during the current study also showed that some of the producers in the study area tie chickens in house (Figure 2) during the day to protect the animals from robbing cultivated crops, and feed and malt grains kept under sun heat for flouring. Chicks mainly during their early age were kept in underground pits covered with different materials, in woven baskets and under tree shades so that they are protected from preying birds. All chickens, irrespective of their age and sex, move freely forming subgroups in and around the households and neighborhoods that give chance for hens to mate indiscriminately with own flock and/or neighbor flock roasters which leads to uncontrolled breeding.

Among chicken flocks in the current study; 82.94, 95.15 and 81.43% were indigenous breeds of Horro (highland), Bako-Tibe (lowland) and Leka-Dulecha (mid-altitude), respectively; the remaining chicken breeds were commercial layers, broilers and exotic dual-purpose chickens or hybrids (Table 5). New breeding stock establishment and replacement was through hatching, purchasing (pullets and cockerels), sharing with, and sometimes gifts from family and friends. The annual mean and standard deviation of chicken sold and slaughtered for consumption exceeds those replaced by hatching and purchasing. This might have been because producers cull chicken whenever disease outbreaks occur (Table 5). The offer of chicken mainly hens for share is a common practice in Ethiopia and it is a system people use to support their poor relatives. By this process, a share giver is the one who either wants to support his poor relative or has no space or time to rear chickens. The mother hen therefore will remain the property of the share giver where the egg produced and the chicks reared will be shared for the two parties (Table 6).

Poultry production, marketing and Health constraints

Due to disastrous chicken disease outbreaks and epidemics, producers may loss the whole flock or sometimes the majority of their flock at a time. About 88.6% of chicken holders interviewed responded that

Table 4. Feeding, Housing and hatchery management of chicken.

Factors Feeding management	Label of application	Frequency	Percent
Offer feed supplement	Yes	292	94.19
	No	18	5.81
Source of feed supplement	Grain from home	135	46.23
	Concentrate	12	4.11
	Kitchen leftover	5	1.71
	Grain from market	7	2.4
	Grain from home and Market	76	26.03
	Grain and kitchen leftover	57	19.52
Housing management			
Separate house for chicken	Yes	23	7.44
	No	286	92.56
Alternative House for chicken	Kitchen	56	19.51
	In family house	211	73.52
	Under home ceiling	9	3.14
	In Basket or cartoon	11	3.83
Hatchery management			
Was chick brooding season based?	Yes	295	95.16
	No	15	4.84
Storage of egg for incubation	one-week	3	0.97
	two-weeks	56	18.18
	10 days	25	8.12
	till hens sit to brood (not collected)	224	72.73

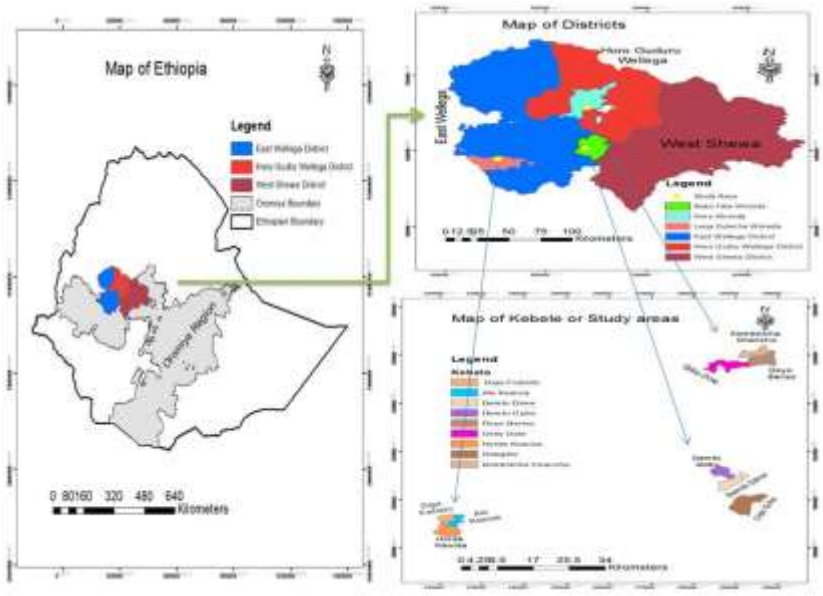

Figure 1. Map of study area (East Wollega, Horro Guduru Wollega and West Shewa zones of western Oromia, in Ethiopia).

Figure 2. Some of the Chicks' and Chicken's Housing and management systems used: left is a pit to rear chicks, middle is a kitchen and cattle barn where chicken bed during night and right is how chicken were tied during the day to protect them from crops at back yard.

Table 5. Chicken breed composition, marketing and source of replacement.

Factors	Variables	Study agro-ecologies (districts)						Overall means and standard deviations	
		Horro (highland)		Bako-Tibe (Lowland)		Leka-Dulecha (mid-altitude)			
		N	Means± Std	N	Means± Std	N	Means± Std	N	Means± Std
Breed of Chicken	Local	100	9.31(4.972)	89	13.39(6.999)	117	9.34(6.111)	306	10.51(6.308)
	Commercial	99	1.915 (0.69)	87	0.468 (0.11)	117	1.43 (0.650)	303	1.45 (0.510)
	Hybrids	97	0	87	0.214 (0.02)	115	0.78 (0.160)	299	0.50 (0.070)
Marketing and source of replacement	Chicken sold in six months	100	3.65(1.817)	92	1.924(1.760)	118	2.43(2.423)	310	2.63(2.224)
	Chickens Consumed in 12 months	100	1.93(0.868)	92	1.62(1.212)	118	0.91(0.730)	310	1.38(1.125)
	Chickens bred for replacement	100	0.901(0.420)	92	1.073(0.550)	118	2.21(2.040)	310	1.74(1.080)
	Obtained by gift to produce	100	0	92	0.179(0.030)	118	0.26(0.050)	310	0.19(0.031)
	Obtained for share	100	0	92	0.885(0.170)	117	0.16(0.030)	309	0.50(0.060)
	Males bought for replacement	100	0.544(0.370)	92	0.584(0.290)	118	0.71(0.250)	310	0.62(0.03)
	Females bought for replacement	100	0.613(0.260)	92	0.62(0.613)	118	1.97(1.530)	310	1.84(0.850)

N = number of respondents interviewed.

Table 6. Chicken ownership and Poultry product income utilization.

Family member	Chicken owner		Family member who use income from egg sale		Family member who use income from chicken sale	
	Frequency	%	Frequency	%	Frequency	%
Household head	35	11.29	22	7.10	39	12.58
Spouse	77	24.84	113	36.45	73	23.55
Children	78	25.16	54	17.42	53	17.10
Whole family	87	28.06	91	29.34	104	33.55
Husband and wife	33	10.65	30	9.68	41	13.22

Table 7. Production, marketing and health constraints.

Attributes	Label	Agro-ecologies (Study Districts)						Overall	
		Highland(Horro)		Lowland(Bako)		Midaltitude (Leka-Dulecha)			
		N	%	N	%	N	%	N	%
Was disease out-break occurred in your flock	Yes	97	97	88	96.7	87	74.34	272	88.6
	No	3	3	3	3.3	30	25.66	35	11.4
Chicken group affected more	Chicks	38	38.38	22	25.58	7	7.78	67	24.36
	Growers	0	0	4	4.56	1	1.11	5	1.82
	Layers	8	8.08	1	1.16	8	8.89	17	6.18
	Adults	2	2.02	0	0	3	3.33	5	1.82
	Chicks and layers	47	47.47	59	68.60	71	78.89	177	64.36
	Whole flock	4	4.04	0	0	0	0	4	1.45
Is vet service available in your area	Yes	58	58	52	56.52	84	71.19	194	62.58
	No	42	42	40	43.48	34	28.81	116	37.42
Is vet. service efficient	Yes	8	8	18	19.56	24	20.51	50	16.18
	No	92	92	74	80.43	93	79.49	259	83.82

they faced severe poultry disease outbreaks during their production practices. Concerning animal groups affected among the chicken flocks, chicks and layers together were the most affected (64.36%) followed by death of only-chicks (24.36%).

Chicken disease and lack of efficient veterinary services were among the major poultry health constraints in the study area (Table 7). Animal vulnerability was studied by categorizing chickens into layers, adults, chicks and layers, and whole flock. It is indicated that they faced severe poultry disease outbreaks during their production practices. Concerning animal groups affected among the chicken flocks, chicks and layers

Table 8. Chicken and egg marketing and market structure.

Market opportunities used	Marketable products			
	Chicken sale/marketing		Egg sale/marketing	
	Frequency	%	Frequency	%
Sale at home	5	1.62	25	8.09
Village-market	110	35.60	175	56.63
Middle-men	25	8.09	12	3.88
Nearby-town	169	54.69	97	31.39

Figure 3. Chicken transporting and marketing system commonly practiced in the study area.

together were the most affected (64.36%) followed by death of only-chicks (24.36%). Chicken disease and lack of efficient veterinary services were among the major poultry health constraints in the study area (Table 7). Animal vulnerability was studied by categorizing chickens into layers, adults, chicks and layers, and whole flock. It is indicated that 62.58% of respondents interviewed could get veterinary services in their surroundings; however, 83.82% of the respondents interviewed reported that they were not satisfied by the veterinary services efficiency.

Marketing live birds and eggs was run mainly at either village and/or nearby towns (district) market, which would take the major part in poultry marketing in the study area (Table 8). The marketing system in the area was unimproved, which may expose the animals to physical injury, meat bruise, contamination with disease agents and sometimes death due to suffocation (Figure 3). The transporting system used mainly for the chickens bought for resell was by carrying birds on shoulder. Marketing was undertaken mainly at secondary markets that took place on roads, travelling home to home, and selling to hotels and restaurants through an informal contractual agreement.

Poultry market in the study area was mainly primary market where marketing takes place at farm gate, to intermediaries, village market and district markets. Intermediaries in the study area were those traders who collect live chicken and egg from producers at home gate or standing on ways to market to transport that mass to secondary markets or end users. Chickens mainly (54.89%) were sold at district (nearby) town which might be because of the fair price and/or lack of chicken market at village/surrounding they may obtain. However, eggs were sold mainly (56.63%) at village markets.

DISCUSSION

Majority of household heads in the study area were male among which 56.46% had attended elementary school. This is somehow contrary to the report by Getu and Berhan (2014), in North-west Ethiopia, who documented 10% of respondents who went through elementary school. About 93% of the household heads were between 20 and 60 years age, which implies that it is the working class in general and householders with significant family size that engage in poultry production. The mean chicken holding per household (11.15±6.16)) in the current study is lower than the overall mean holding 16.43 (± 0.92); however, it is in accordance with the report of Guèye (1998), Tadelle and Ogle (2001) and Tadelle (2003), who documented almost every village household keeps

domestic fowl (on average between 5 and 20 birds). The result of the current study was found higher than the average holding 7.3 chicken reported by Matiwos (2013). Though poultry was the highest in mean population among livestock holdings, cattle are reported as most important as they are used for both draft and milk production purpose.

The most common chicken production system practiced in the study area was back yard extensive production system where chickens rely mainly on scavenging types of feeding. Chickens were integrated with other livestock and crop production. This agrees with the findings of other studies (Sonaiya, 1990; Kitalyi, 1998). The overall mean family size (6.19 ± 2.16) in the study area was in agreement with the report by Mekonnen (2007) who documented 6.9 mean family size in southern Ethiopia. However it is higher than the 5.2 national average reported by Moreda et al. (2013) and the 5.77 ± 0.57, 6.10 ± 0.44 and 6.73 ± 0.48 persons for Quara, Alefa and Tach Armachiho districts respectively, average family size reported by Getu and Berhan (2014) in northwestern Ethiopia. The agricultural landholding per household identified in the current study (1.68 ±1.50) is lower than the highest holding 5.20 ± 0.90 in Quara but in agreement with the lowest 1.7± 0.25 ha/hh from Alefa district of Amhara National State in Ethiopia, reported by Getu and Berhan (2014).

Chickens in the study area are mainly kept during night in family homes, in the kitchen, under the ceiling and eves of living homes and at some corner in other livestock barns. Only few householders (7.44%) who own larger number of chicken and trying to modernize production system build separate chicken houses. Chickens even though, are higher in mean population among the livestock composition reared in the study area, they were the least preferred with respect to level of importance in the livelihood of the farming society. However, for some households who do not have cropping lands and do not engage in off-farm duties, chickens may take better level of importance among other domestic animals.

The purpose of chicken production for about 90.85% producers interviewed was for sale. The income collected from sale of chicken and eggs was used to satisfy home expenditure and school fee, used as a source of initial capital for chicken production; mainly 87.58% was agriculture where both poultry production and agriculture complement each other. Chicken ownership according to this study was for whole family, husband and wife in common, spouse, children and sometimes exclusively for husband in a descending order. According to the result of this study women took the main part in chicken control and product management since they often stay at home during the day. This is in agreement with the report by Bradley (1992), Bishop (1995), Riise et al. (2004); however, they did not take the main part for ownership. This report, therefore, is in contrast with the report of Mcainsh et al. (2004) and Abubakar et al. (2007), where in several African countries, approximately 80% of the chicken flocks are owned and largely controlled and managed by rural women. However, in male headed households, whole family in general, wife and husband in particular, were the major owners of chickens. Decisions on egg consumption and chicken slaughtering, poultry product sale and utilization, and breeding stock selection were undertaken by the consult of husband and wife where income collected from egg sale was utilized by housewives. Children sometimes were also allowed to sell their own chicken and eggs to use income collected to cover expenses for school, to purchase clothes and save for further businesses.

Farmers make use of income generated from chicken sale for purchase of agricultural inputs, which include: fertilizer and seeds, farming-land renting, children's school fee, purchase of food items (mainly sauces) and as initial capital for investment to purchase other livestock mainly small ruminants. The result agrees with the report by Moreki et al. (2001), Tadelle and Ogle (2001) and Gueye (2003). Chickens also have social heritages that families and relatives offer breeding pullets for their poor relatives as a foundation stock and the distribution of hens for share could also strengthen the social bond among the share givers and takers.

The per household percent chicken breed calculated for; exotic chicken in the current study indicated for either commercial layers, hybrids or dual-purpose chickens was higher than the report by Dana (2010), who documented more than 95% of the total chicken populations of Ethiopia comprise the indigenous genotypes. The higher percentage of exotic chicken ecotypes reported in the current study might be because there was a project run in the area by "Ethio-chicken" that distributes a day old chicks to farmers and grower organizations that temporarily had lift up the number of exotic chicken in the area.

The major constraints in poultry production in the study area were poor management, high disease prevalence (mainly New Castle Disease and fowl typhoid) and low access to inputs (mainly improved chicken breeds, commercial concentrated feeds, veterinary services). Lack of sustainable market and marketing structure was also the market constraint facing in the area where the result is in accordance with the report by Kondombo (2005); Nigussie et al. (2003) and Wilson et al. (1987). The market price was fluctuating with cultural and religious festivals, season of the year and disease occurrence where it gets higher during holy days, dry season of the year and when there is no disease outbreaks as compared to regular market days. Disease epidemics and chicken predators were also among the major constraints in chicken production in the area. Producers lose the whole flock of their chickens when diseases such as New Castle Disease and Fowl typhoid occur. This report agrees with the report documented by Nigussie et al. (2003); Tadesse et al. (2005) and Nwanta et al. (2008), where the disease spreads rapidly through

the flock and mortality could reach up to 100%.

CONCLUSION AND RECOMMENDATIONS

Poultry production system in the study area was an integrated system that agriculture is a mixed crop-livestock production system where livestock; such as cattle, sheep, goats, equines, chicken, and for some households honeybee colonies and fishponds were part of their production system. Chicken holding in the area was from none to many and households who do not possess chickens were those who might have lost their flock due to disease outbreaks while those who had large size chicken flock were those who were trying to improve poultry production.

Poultry feeding system was scavenging type where no regular supplementations was practiced with grain from home and market, kitchen leftover and concentrate to a limited extent, and housing was mainly in family homes. Poultry housing with no variation among the agro-ecologic differences was mainly in the family homes and feeding system was scavenging in its character. Poultry production therefore was constrained by low productivity mainly because of less productive genetic performance and poor management, recurrent disease outbreaks, traditional marketing system and unorganized market structure. Chicken production and breed improvement were facing challenges of improved chicken breed input supply problems, high cost of concentrate feeds, vulnerability of exotic chicken breeds to different chicken diseases and inconvenient environment.

The integrated crop-livestock production system and complementarities among chicken and other livestock production is the best opportunity for improvement of rural chicken production as crop left over, cow dung and decomposition of animal manure and crop residues are best sources of complete feeds to the birds. In addition, farmers can improve chicken feeding system by using home produced grains and family feed leftover. Proper use of veterinary services and use of vaccination in the area and improvement of housing system (mainly use of hay-boxes for brooding) could reduce risk of loss of chicken flock by disastrous diseases and predators (prey birds and cats). Marketing system practiced in the area was very primitive that prone chicken to muscle bruise and sometimes death, which was also tiresome to market practitioners. Further research is recommended for identifying Horro chicken ecotype production potential and strategic approach for breed improvement through selection and crossbreeding with appropriate exotic chicken breeds.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests

ACKNOWLEDGEMENTS

The authors thank Wollega University (Office of research and technology transfer) and Addis Ababa University (Office of Graduate studies) for the financial grant of operational research project. The best gratitude is also to Diribe Kumsa, Diriba Diba and Mesfin Mengistu for their cooperation in facilitating the study. Special thanks to rural farmers who with no reservation responded to questionnaires and data collectors who gathered the data passing all the rigorous challenges.

REFERENCES

Abera M (2000). Comparative studies on performance and physiological responses of Ethiopian indigenous (Angete Melata) chickens and their F_1 crosses to long term heat exposure. Ph.D. dissertation, Martin-Luther University. Halle-Wittenberg Germany P 127.

Abdelqader A, Wolnny BA, Gauly M (2007). Characterization of local chicken production systems and their potential under different levels of management practice in Jordan Animal breeding and husbandry in tropics and subtropics. Georg August University Gottingen, Kellnerweg 6, 37077 Gottingen, Germany.

Abubakar MB, Ambali AG, Tamjdo T (2007). Rural chicken production: Effects of gender on ownership, and management responsibilities in some parts of Nigeria and Cameroon. International Journal of Poultry Science 6(6):413-416.

Alliance for a Green Revolution in Africa (AGRA) (2014). Africa agriculture status report: Climate change and small holder agriculture in Sub-Saharan Africa." Nirobi, Kenya pp. 14-17.

Bellhouse DR (2005). Systematic Sampling Methods. In P. Armitage & T. Colton (eds.), Encyclopedia of Biostatistics (2nd edn; Hoboken, NJ : Wiley-Blackwell) P 6100.

Bishop JP (1995). Chickens: Improving small-scale production." Echo technical note 10.

Bradley FA (1992). A historical review of women's contributions to poultry production and the implications for poultry development process. In: Proceedings of the 19th World's Poultry Congress, Amsterdam, the Netherlands pp. 693-696.

Central Statistics Agency (CSA) (2016). Agricultural sample survey 2015/16, 2: statistical bulletin 583. Report on livestock and livestock characteristics (private peasant holdings), Addis Ababa, June 2016.21.

Dana N, Dessiea T, van der Waaija LH, van Arendon JAM (2010). Morphological features of indigenous chicken populations of Ethiopia. Animal Genetic Resources Information 46:11-23.

Food and Agriculture Organization of the United Nations (FAO) (1997). Guidelines for the inclusion of improved household poultry production." Diversification component of the special programme for food security. FAO, Rome, Italy P 86.

Food and Agriculture Organization of the United Nations (FAO) (2016). Draft guidelines on phenotypic characterization of Animal genetic Resource. on Genetic Resources for Food and Agriculture Rome.

FAOSTAT (2016). FAO Statistical Year book 2016." FAO, Rome, Italy. http://faostat.fao.org/.

Gondwe TNP (2004). Characterization of local chicken in low input–low output production systems: Is there scope for appropriate production and breeding strategies in Malawi?" PhD thesis. Georg- August-Universität Göttingen, Germany P 184.

Hadera G (2002).Role of livestock in food security and food self sufficiency in the Highland production system. Proceedings of 9th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, August 30-31, 2001. 433 p.

Halima H (2007). Phenotypic and genetic characterization of indigenous chicken populations in northwest Ethiopia."Ph.D Thesis. University of the Free State, Bloemfontein, South Africa pp. 71-73.

Getu A, Berhan M (2014). Chicken Production Systems, Performance and Associated Constraints in North Gondar Zone, Ethiopia. Journal

of Fisheries Livestock Production 2:115. doi: 10.4172/2332-2608.1000115.
Gueye EF (2003). Poultry plays an important role in Africa village life. World Poultry 14:14-17.
Kitalyi AJ (1998). Village chicken production systems in rural Africa: Household food security and gender issues (No. 142). Food and Agriculture Org.
Kondombo SR (2005). Improvement of village chicken production in a mixed (chicken-ram) farming system in Burkina Faso." Ph.D Thesis. Wageningen Institute of Animal Sciences, Animal Nutrition Group, Wageningen University, the Netherlands. http://library.wur.nl/wda/dissertations/dis3846.pdf
Matiwos H, Selamawit D (2014). On-station and on-farm comparative performance evaluation of ha box chick brooder at Dilla University and Amaro Woreda, Snnprs of Ethiopia. American Journal of Research Communication 2(8):172-188.
Mcainsh CV, Kusina J, Madsen J, Nyoni O (2004). Traditional chicken production in Zimbabwe. World's Poultry Science 60:233-246.
Mekonnen G (2007). Characterization of Smallholder Poultry Production and Marketing System of Dale, Wonsho and Loka Abaya Weredas of Southern Ethiopia." Msc. Thesis presented to the School of Graduate Studies of Hawassa University Hawassa Ethiopia pp. 45-46.
Moreda E, Hareppal S, Johansson A, Sisaye T, Sahile Z (2013). Characteristics of Indigenous Chicken Production System in South West and South Part of Ethiopia. British Journal of Poultry Sciences 2(3):25-32.
Moreki JC (2010). Village poultry production in Serowe-Palapye sub-district of Botswana. Livestock Research for Rural Development. 22(3):46. http://www.lrrd.org/lrrd22/3/more22046.htm.
Nigussie D, Alemu Y, Tadelle D, Samuel WH (2003). On-station and on-farm evaluation of the 'hay-Box chick brooder' using different insulation materials at Debre Zeit Agricultural Research Center and Denbi village, Adaa woreda." In: Proceedings of the 10th annual conference of the Ethiopian Society of Animal Production (ESAP), August 21–23, held in Addis Ababa, Ethiopia pp. 211-216.
Nwanta JA, Egege SC, Alli-Balogun JK, Ezema WS (2008). "Evaluation of prevalence and seasonality of Newcastle disease in chicken in Kaduna, Nigeria. World's Poultry Science Journal 64:414-416.
Olana BT (2006). People and Dams: "Environmental and socio-economic changes induced by a reservoir in Finca'a water shade Western Ethiopia." PhD Thesis, Wageningen University, The Netherlands.
Pedersen CV, Kristensen AR, Madsen J (2002). On-farm research leading to a dynamic model of a traditional chicken production system. In Proceedings of the joint 17th Scientific Conference of the Tanzania Society for Animal Production and the 20th Scientific Conference of the Tanzania Veterinary Association held in Arusha, Tanzania on 3rd to pp. 237-247.
Riise JC, Permin A, McAinsh CV, Frederiksen L (2004). Keeping village poultry. A technical manual for small-scale poultry production. Copenhagen, Denmark pp. 43-44.
Sonaiya EB (1990). The context and prospects for development of smallholder rural poultry production in Africa. CTA-Seminar proceedings on smallholder rural poultry production 9-13 October 1990, Thessaloniki, Greece 1:35-52.
Tadelle D, Ogle B (2001). Village poultry production system in the central high lands of Ethiopia. Tropical Animal health and production 33:521-537.
Tadelle D (2003). Phenotypic and genetic characterization of local chicken ecotypes in Ethiopia. PhD Thesis, Humboldt University of Berlin, Germany 209 p.
Tadelle D, Million T, Alemu Y, Peters KJ (2003). Village chicken production systems in Ethiopia: 1. Flock characteristics and performance. Livestock Research for Rural Development 15(1):2003. www.lrrd.org/lrrd15/1/tadea151.htm
Tadesse S, Ashenafi H, Aschalew Z (2005) "Sero-prevalence study of Newcastle disease in local chickens in central Ethiopia. International Journal of Applied Research and Veterinary Medicine 3(1):25-29.
United Nations Population Division (UNPD) (2008). The 2006 revision and world urbanization prospects: the 2005 Revision." Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects.