

Chicken Production System, Reproductive Performance, Opportunities and Associated Challenges in Fogera District, South Gondar Zone, Amhara Ethiopia

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Abstract

This study was conducted to characterize and describe village chicken production system, reproductive performance, opportunities and associated challenges in Fogera distinct south Gonder zone of Ethiopia. For this study four kebeles from this district and 160 households from each kebele were selected using purposive sampling method a survey was conducted on 40 selected households to describe the village chicken production system reproductive performance and management practice. In majority of the households (80%) were male responsible for chicken rearing and 100% of the respondents in the study area manage chickens extensively. Night shelter was provided by all farmers mostly 92.5% on perch bamboo cage (5%) and purposely made house (2.5%). Almost all respondents (95%) provided feed supplement and 100% of the respondents provide water to their chicken. On average hens and cock reach at sexual maturity per month 4.8 and 4.45 months respectively. The average number of eggs per clutch per hen in the study area was 11 and the average number of eggs incubated per hen was 8.75. The average hatchability was 79.6%. All the respondents (100%) in the study area obtained their initial chick stock by purchasing and 55% and 45% of the respondents in the study area obtained replacement stock by hatching and purchasing respectively. All respondents (100%) in the study area responded new castle disease outbreak. About 25% respondents used extension service in poultry production and 100% of the respondents had an interest to expand the production

Keywords: chicken, production, reproductive performance, opportunities challenges

Introduction

Poultry production is categorized into traditional scavenging, small and large scale market oriented sectors, which based on the objectives of the producers, the type of inputs used and the number and types of chickens kept (Halima, 2007). According to FAO (2007), the rural poultry sector constitutes about 98% of the total chicken population and are largely consists of the indigenous or native domestic fowl. The traditional scavenging production is characterized by a low level of input and output.

Chicken rearing is especially favorable to smallholder farmers due to its low capital requirements, high cost efficiency, flexible production systems and low production risk (Embet 2015). Chickens contribute to various livelihood outcomes including gender equality and cash income in addition to its role in cultural, religious and traditional practices (Tadelle et al. 2003).

On the other hand, village chicken production has its own problem that affects their productivity. Some of them are due to disease and predation (Wilson et al., 1987 cited by Embet, 2015.), limitation of feed in terms of both quality and quantity (Saleem and Tedla, 1995). In addition to the above constraints low productivity of local chickens, poor extension service and inadequate credit facilities, seasonal fluctuation of price and lack of processing facilities affect the productivity of village chicken. (Singl, 1998).

So comprehensive assessment of production systems, identification of production systems and associated constraints in the study area will be included, so by considering the above mentioned problems this research is conducted the following objectives. To assess the village chicken production system, reproductive performance and associated challenges in Fogera district and to identify the most important problems and constraints associated with village chicken production system in the study area.

Materials and Methods

Description of Study Area

The study was conducted in Amhara National Regional State (ANRS) in south Gonder zone Fogera district. Fogera district is one of the eight districts bordering Lake Tana. It is situated at 11°58'N latitude and 37°41'E longitude. Woreta, capital city of the fogera woreda is found 625 km from Addis Ababa and 55 km from the regional capital city Bahair Dar (IPMS, 2005). The total human population of the woreda according to the current data is 228449, out of this 111984 females and the rest 116465 is male. The woreda has also great potential for livestock population. It has 266498 cattle, 41466 sheep, 31704 goats, 131341 chickens, 17600 beehives, 31693 donkey, 976 mules and 18 horses (Fogera Woreda Agricultural Office, 2016). The agro ecology of the woreda is predominantly classified as woyina dega ecology. The average temperature ranges from 11.4°C-

27.2*c. The annual rainfall ranges from 1103-1336ml and the altitude ranges between 1750-2500 m.a.s.l. The total area of land in the woreda is 117414 ha. The average land holding is about 1.4 ha per household (FWAO, 2016). The soil type of the woreda is verity, which contributes 65%, clay soil 20%, red soil 12% and grey soil 3% (FWAO,2016).

Methods of Data Collection

Primary data for this study were collected through survey (questionnaire) and short period monitoring. Secondary data were collected through meticulously reviewing published and unpublished information relevant to work. The four sample kebeles (Kuhar Abo, Kuhar Michael Woreta zuriya and Shina) were selected based on the information and consultation with woreda agricultural experts. The four kebeles were selected random purposive selected method according to the infrastructure and the resource availability.

Each flock owner were interviewed, among other, about the history of origin, composition of the livestock mix, flock ownership patterns, flock demography, productivity and reproductive performance (approximate age of sexual maturity, numbers of eggs in one clutch per bird, number of frequent brood per year, number of egg incubated per hen, number of chicks hatched per one incubation period, number of egg incubated per hen). Importance of chicken in the house hold, source of first foundation stock, barrier of future expansion, access to extension services, practice and character of selection, feed and feeding (type of nutrition, management, time and giving of supplementary feeds type of feed trough use base of offspring supplementary feeds, season of extra feeds offer, feed shortage season, priority of supplementary additional feed in each class, water source and distance from the home stead) and transport, health condition, Cause of mortality, name of disease, access of veterinary service, season for loosing most chicken, source of infection.

Data Management and Analysis

The data were analyzed through hard copy. Descriptive statistics such as tables, means and percentage were used to analyze categorized data.

Result and Discussion

Characteristics of village chicken production system

House hold characteristics and respondents profile

The household characteristics of the respondents are presented in table 1

Table 1 socio economic status of the respondents.

No	Parameter	Study kebele				Overall mean
		Worat zuria	Kuhar Abbo	Kuhar Michael	Shina	
1	Sample size (No)	40	40	40	40	
2	Sex of respondent (%)					
	Male	100	70	80	70	80
	Female		30	20	30	20
3	Average age of respondent	40.6	36.3	35.5	44.1	39.1
4	Educational level (%)					
	- illiterate	40	70	70	20	50
	- Read and write	20	10	10	20	1.5
	- 1 st – 4 th grade	10		20		7.5
	- 5 th -8 th grade	10	10		20	10
	- 9 th – 12 th grade	20	10		40	17.5
5	Mean land size (ha)	0.875	0.525	0.85	1.1	8.3
6	Family size (average)					
	- Male	2.8	2.5	2.2	3.1	2.7
	- Female	2.2	2.8	2.0	2.4	2.4
	- Average	2.5	2.6	2.1	2.7	2.5

From the total interviewed local chicken owners 100%, 70%, 80% and 70% were male in Woreta zuria, Kuhar Abbo, Kuhar Michael and Shina kebele respectively and the overall mean was 80%. This is current study disagreed with the observation reported by Muchadey et al., (2007) which shows that there is a higher proportion of female respondents (79.1%) than males.

The age of respondents were 40.6 years, 36.3years, 35.5years and 44.1years in woreta zuria,kuhar Abbo, Kuhar Michael and shina kebele respectively with the overall mean of 39.1 years. This study is not agreed with Moges et al., (2010a) in North West Ethiopia which was reported that the average age of respondents were 40.9 years.

The educational level of the respondents showed 50%, 15%, 7.5%, 10% and 17.5% are illiterate, read

and write, 1st- 4th grade, 5th-8th grade and 9th- 12th grade respectively. Most of the respondents (50%) was illiterate and this also greater than the report that was written by Embet (2015) which was 41.5%.

The average land holding per house hold in the study area was 0.83ha. The highest average land holding per house hold (1.1ha) was recorded in the shina kebele and the lower (0.525ha) was recorded in kuhar Abbo. This average land per house hold (1.1ha) was lower than those reported by Moges et al., (2010a) and Desalew et al., (2013) which was 1.47ha.

The average family size (family number) of the respondents in the study area was 2.5, 2.6, 2.1 and 2.7 for woreta zuria, kuhar Abbo, kuhar Michael and shina respectively with the overall mean of 2.5. The family size of this study was lower than the national average of 5.2 persons (CSA 2003) and Moges et al., (2010b) who reported 6.2 % per house hold.

Livestock holding

Livestock holding of respondents in the study area was presented in table 2

Table 2 livestock holding of respondents

No	Livestock holding	Study kebele				Overall mean
		Woreta zuria	Kuhar Abbo	Kuhar Michael	Shina	
1	Cattle	50	28	23	61	4.05
2	Sheep		2	16	14	0.7
3	Donkey	2	1		13	0.4
4	Mule	1			1	0.05
5	Chicken	104	112	59	84	8.97
	-Indigenous	81	100	51	56	7.2
	-Cross	21	10	5	16	1.3
	-Exotic	2	2	3	12	0.475
	Average	10.4	11.2	5.9	8.4	8.97

Among the large livestock species, cattle (4.05) dominate followed by sheep (0.7), donkey (0.4) and mule (0.05). The average chicken holding in house hold was observed to be 10.4, 11.2, 5.9 and 8.4 in woreta zuria, kuhar Abbo, kuhar Michael and shina kebele respectively and the overall mean was 8.97. This current study was nearly in line with Meseret, 2010 that an average flock size of 6.23birds per household was reported in Gomma wereda of Jimma zone regarding to the breeds of the chicken average indigenous, cross and exotic chicken found per household was, 7.2, 1.3 and 0.475. When we observe the exotic chicken it was lower in per house hold than the rest of two breeds. As we understand from the respondents this lower number comes because of low awareness about exotic breeds.

Flock structure

Table 3 flock composition per house hold in the study area

No	Different types of chicken	Study kebele								Overall mean	
		Woreta zuria=40		Kuhar Abbo=40		Kuhar Michael=40		Shina=40		No	%
		No of chicken per house hold	%	No of chicken per house hold	%	No of chicken per house hold	%	No of chicken per house hold	%		
1	Starter	4.3	41.3	4.3	41.3	0.8	13.5	1.8	21.4	2.7	31.7
2	Finisher	1.4	13.46	1.2	11.7	1.1	18.6	2	23.8	1.4	16.5
3	Grower	1.6	15.38	0.6	5.9	1.8	30.5	1.2	14.2	1.3	15.3
4	Layer	2.4	23	2.8	27.4	1.6	27.1	2.7	32.1	2.3	27
5	Breeder	0.7	6.73	1.3	12.7	0.6	10.1	0.7	8.3	0.8	9.4
	Total	10.4	100	10.2	100	5.9	100	8.4	100	8.5	100
	Average	2.08		2.04		1.18		1.68		1.72	

Average chicken flock size per house hold in the study area observed to be 2.08, 2.04, 1.18 and 1.16 birds with an overall mean of 1.72 in woreta zuria, kuhar Abbo, kuhar Michael and shina respectively. Out of the overall mean starters account the higher percent (31.7%) and breeder accounts the least percent (9.4%).

Chicken management practice

The various chicken management systems, feed and feeding practice, watering and housing observed in the study area was presented in table 4

The table 4 chicken management system, feeding practice and housing management in the study area

N o	Parameters (%)	Study kebele				Overall l mean
		Woreta zuria=40	Kuhar Abbo =40	Kuhar Michae l=40	Shina =40	
1	Chicken management system					
	- extensive	100	100	100	100	100
	- semi intensive					
	- intensive					
2	supplementary feeding					
	- yes	90	100	100	90	95
	- no	10			10	5
3	Means of feeding					
	-thrown on the ground	40	50	40	60	47.5
	-Provide with container	50	50	60	40	50
4	Frequency of feeding					
	- No feeding	10				2.5
	- Once per day	20	40	30	20	27.5
	- Twice per day	70	60	70	80	70
	- Three time per day					
5	Housing (rest at night)					
	- On perch	100	90	80	100	92.5
	-Purposely made house		10			2.5
	- Bamboo cage			20		5
6	Cleaning of shelter					
	-per week on average	6.8 days	5 days	5.14 days	3.2d ays	5.035 days

Chicken management systems

The major prevailing management systems were extensive (traditional). About all the respondents followed extensive management system within an overall means of 100%. According to the study of Halima (2007) the overall average of 71.55% respondents in southwest Showa and Gurege zone practice extensive system of chicken production system. It was disagreed with our current study that 100% of the respondents practice extensive management system. All the respondents following this management system because of lack of awareness how they manage.

Feed and feeding practice

Almost all (95%) of respondents in the study area provided supplementary feed to their chicken. This study was disagreed with the reports of Mengesha et al., (2011) observed that 98% of respondents provided supplementary feed to their chicken. 50% of the respondents fed their chicken with container and the rest throw on the ground. This observation was disagreed with Embet (2015) that 88.8% of farmers provided the feed with container and the rest throw on the ground. 70% of the respondents provide feed twice per day. It is higher than khandait et al., 2011 that about 44.6% of respondents were giving supplements two times a day.

Housing

From the table that all the village chicken owners (100%) provide shelter to their birds during night. Most of the respondents (92.5%) kept their birds on perches inside the house while small number of respondents (5%) kept their birds in bamboo cage and the rest 2.5% kept in the house purposely made for chicken. Chickens were confined only during the night and on average 5.035 days per week cleaned the shelter of the birds.

According to Halima et.al., (2007) reported in north west part of Ethiopia 90.9% of the village chicken owners kept birds on perches inside the house which is lower than from our current study. 3.5% of the respondent bamboo cage and 0.3% in separate sheds purposely made for chicken.

Watering practice

Table 5. Provision of water for chickens in the study area.

No	Parameter (%)	Study kebeles				Overall mean
		Woreta zuria=40	Kuhar Abbo=40	Kuhar Michael =40	Shina=40	
1	Provision of water					
	Yes	100	100	100	100	100
	No					
2	Types of water					
	-Clay material			10	10	5
	-wooden material	10		10	50	17.5
	-metallic material			10		2.5
	-plastic					75
3	Frequency of cleaning water					
	-once a day	40	20	70	80	52.5
	-once per week	10	10		20	10
	Twice per week	10	30	30		17.5
	No cleaning	40	40			20%

The information recorded for provision of water, types of waterier and frequencies of cleaning waterier were presented in table 5. From this table all the respondents (100%) in the study area had provided water for their birds. This study was on line or agreed with the report of Moges et al. (2010a) and Mengesha et al.,(2011). The majority of the chicken owners (75%) provided in plastic container followed by wooden material (17.5%), clay material (5%) and metallic container (2.5%). According to Moges et al. (2010a) and Mengesha et al., (2011) the container that they reported was disagreed with the current study. They reported that 76.4% of chicken owners provide water in plastic container, 20.3% clay, 2.7% wooden container and 0.7% was metallic container. 52.5% of the respondents clean the container (waterier) once a day 10% of the respondent clean once per week, 17.5% of the respondent clean twice per week and the remaining 20% didn't clean the container. This is finding was disagreed with Moges et al. (2010a) and Mengesha et al.(2011) they reported that 55.4% of the respondents cleaned the waterier daily followed by once per week (10.8%) and 22.6% of the respondents do not clean the waterier.

Production and reproductive performance

Productivity of chicken

Table 6 productivity of chicken in the study area

NO	Parameters	Study kebeles				Overall mean
		Woreta zuria	Kuhar Abbo	Kuhra Michael	Shina	
1	Age at sexual maturity per month					
	- Hen	3.5	5.25	4.8	5.7	4.8
	- Cock	4.2	4.16	4.45	5	4.45
2	Number of times the hen hatches per clutch	3.6	2.55	3.3	4	3.36
3	Average number of eggs per clutch	10.3	12	11	10.8	11
4	Average number of days per clutch	21	21	21	21	21
5	Average number of eggs hatched per set	8.9	8.6	8.7	8.8	8.75
6	Hatchability (%)	86.4	71.6	79	81.4	79.6

From the table the hen and cock reached at sexual maturity in 4.8 and 4.45 months respectively. This result is disagreed with Moges (2010a) who observed that hen and cocker reached sexual maturity at the average age of 5.5 and 6.5 months respectively. The hen hatched on average 3.36 times per year. The average number of eggs per clutch was 11 and the average number of eggs hatched per set was 8.75. The hatchability of the hen that hatched from set of eggs was 79.6%. This current study totally disagreed with the finding of Halima (2007) reported that the average number of eggs per clutch per hen was 12 with 3 times per year of clutch and average number of eggs used for hatching was 11 and out of these on average 76.6% eggs were hatched.

Source of initial stock and replacement chicks

Table 7 source of chicks' replacement stock and finance for village chicken production.

No	Parameters (%)	Study				Overall mean
		Woreta zuria	Kuhar Abbo	Kuhar Michael	Shina	
1	Source of initial chick stock					
	- Purchased	100	100	100	100	100
	- Hatched					
2	Source of replacement chicks					
	- Hatched	50	50	60	60	55
	- Purchased	50	50	40	40	45
3	Source of money for poultry production					
	- Sell of poultry					
	- Sell of crops	100	90	100	100	97.5
	- Off- farm income		10			2.5

The results revealed that all the respondent in the study area obtained chicks initially by purchasing from nearby local market (100%), 55% and 45% of the respondents in the study area obtained their replacement stock by own hatching and purchasing respectively. The overall major finance source of replace and to start chicken production was cell of crops (97.5%) and off farm income (2.5%). This current study was disagreed with the reports of Halima (2007) and Tadle (2003) that 91.9% of the respondents get their initial chicken stock by purchase and source of replacement stock was recorded as hatching 63.9% and by purchase 31.1% and 46.36% of the respondents sells of crop for poultry production and 16.5% off farm income.

Chicken disease prevalence and control measure

Table 8 chicken disease prevalence and control measure

No	Parameter (%)	Study kebeles				Overall mean
		Woreta zuria	Kuhar Abbo	Kuhar Michael	Shina	
1	Occurrence of disease					
	Yes	90	90	100	90	92.5
	No	10	10		10	7.5
2	Main disease					
	- New castle disease	100	100	100	100	100
3	Treatment					
	- Traditional treatment	70		20	30	30
	- No treatment		10			2.5
	-consult doctor (vet).	20	80	80	60	60

The observation recorded on prevalence of chicken disease and their control measures are summarized in table 8. These result revealed that an overall mean average of 92.5% respondents in the study area experienced chicken disease problems while 7.5% respondents did not experienced. All of the respondents (100%) in the study area indicated that new castle disease was the most prevalent and economically important disease that deviates village chicken production.

Further these results an overall average of 30% respondents in the study area use traditional treatment for chicken disease, while an overall average of 2.5% of the respondents in the study area uses no treatment for any poultry disease and 60% of the respondents in the study area call or consult veterinarian for treatment of their poultry. This recent study disagreed with Moges et al (2010b) indicated that 97.6% of the respondents reported the prevalence of disease in their chicken and 86.8%of the respondents respond that new castle disease (NCD) is the most prevalent and economically important disease that devastates village chicken production.

According to the report of Moges et al., (2010a) and Mengesh et al., (2011) in their study area 8.1% of the respondents get advisory service from the vet doctor and 18.9%of respondents do not use any treatment against any disease which greater than from our findings. It indicates that in our study area most of the respondents had awareness how to treat their chickens. Similarly the level of awareness about getting treatment to sick chicken is higher. This because of higher awareness, availability of service and high attrition to village chicken

Extension service

Table 10 provision of extension service, place of meeting and awareness about chicken production in the study area

No	Parameter (%)	Study kebeles				Overall mean
		Woreta zuria	Kuhar Abbo	Kuhar Michael	Shina	
1	Provision of extension service					
	- Yes	40%	30%		30%	25%
	- No	60%	70%	100%	70%	75%
2	Place of meeting					
	- Agents office					
	- At farmers house		10%			2.5%
	- At meeting	100%	90%		100%	72.5%
	-At demonstration size					
	-by chance					
3	Awareness for improved breed and management					
	- Yes	40%	20%		30%	22.5%
	- No	60%	80%	100%	70%	77.5%
4	Source of information					
	- Extension agent	100%	100%		100%	75%
	- Neighbor's, radio and television					25%
5	Interest of expansion					
	Yes	100%	90%	100%	100%	97.5%
	No		10%			2.5%

From table 10 those 40%, 30% and 30% respondents in woreta zuria, kuhar Abbo and shina respectively with in an overall average of 25% respondents in the study area responded that they have got extension service in their poultry production. While 60%, 70%, 100% and 70% respondents in the study area respectively with an overall average of 75% respondents did not use any extension service.

Regarding to place of contact with extension agents, the most common meeting place was at meeting (72.5%) following by farmers house (2.5%).

The awareness of the respondents for improved breed and management 40%, 20% and 30% respondents in woreta zuria, kuhar Abbo and shina respectively with an overall average of 22.5% respondents had awareness while 60%, 80% ,100% and 70% respondents in woreta zuria kuhar Abbo, kuhar Michael and shina with an overall average of 75% did not have awareness.

Interims of source of information 75% of the respondents gained information from extension agents and the remaining 25% of respondents also from neighbors, radio. Among the respondents 97.5% of them had an interest to expand the production but the remaining 2.5% of respondent did not have interest to expand.

Our current study disagreed with a report from north west Ethiopia by Halima (2007) reported that average of 60.1% respondents in the study area used extension service in their poultry production. While an overall average of 39.9% respondents did not use any extension service. Interims of place of contact with extension agents the most common meeting place is farmers' home (48.5%) and association meetings (17.6%). About 84.1% of the farmers obtained chicken related information and 95.1% of the sources of information were agricultural extension agents and the rest sources (8.5%) were neighbors, radio and relative. As Halima (2007) reported 98% of the respondents had an interest of expanding their poultry production.

Conclusion and Recommendation

The study was conducted to characterize and describe village chicken production system, reproductive performance and associated challenges in fogera district south Gonder zone of Ethiopia to generate information on village chicken production system, management and reproductive performance. Four kebeles from the study district 10 households from each kebele were selected using purposive sampling method. The survey was conducted on the total 40 selected households to describe the village chicken production system, management and reproduction performance.

In majority of the households male (80%) were responsible for village chicken rearing. The educational statuses (level) of half of (50%) of the respondents were illiterate. Almost all farmers provide night shelter to their chicken, either on perch (92.5%) or bamboo cage (5%) purposely made house (2.5%). All of the respondents (100%) manage their chicken extensively. Along with full day scavenging about 95% of the

respondents provide supplementary feed. Among these respondents 50% provide with container and 47.5% thrown on the ground. All the respondents (100%) in the study area provide water to their chicken. The majority of the owner provide water in plastic container (75%), followed by wooden material (17.5%), clay material (5%) and metallic container (2.5%).

Age at sexual maturity of hen and cock was 4.8 months and 4.45 months respectively. The average number of eggs per clutch per hen in the study area was 11. Average number of eggs hatched per set is 8.75 the average hatchability were 79.6%.

All the respondents in the study are obtained their initial chicken stocks by purchasing. About 55% of respondents in the study area obtained their replacement stock by hatching 45% by purchasing.

The major source of money for poultry production was sell of crops (95.5%) following by off form income (2.5%).

All respondents (100%) reported Newcastle disease outbreak as a major disease problem. 60% of the respondents in the study area consult doctor about their poultry disease. About 25% of the respondents in the study area used extension service in their poultry production. Almost all (97.5%) respondent in the study area had an interest of expansion their poultry production.

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