

Characterization Of Village Duck Production Systems In Gambela And Benishangul Gumuz National Regional States Of South West And North-West Ethiopia

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Abstract: *Thus this study was carried out based on the objective of identifying and characterizing of production system of duck in Gambela and Benishangul region. This region were selected purposefully based on availability and potential use of duck in the community of the region. Prepared structure questionnaires were administered to very few 21 household respondents due to some reason. The data were analyzed using SPSS software in which cross tabulation procedures were applied. Majority of 66.7 percent household were positioned by female next followed 28.66 percent of position occupied by male. Majority of interviewed farmers have two and more than two hectares of land together for crop and fallow lands. Majority 42.9 percent of respondents were illiterate while other equal 19 percent of respondents were attended elementary and secondary school each respectively. Duck were reared free range and survived mainly 52.4 percent by scavenging. The average flock size of duck was 7.48 ± 5.87 which between the range of 2 -23 birds per house in the area. Most farmers were practicing feeding, watering and selecting of best duck for next generation. Many farmers (81 percent) were given extra feed, mainly grain produced from their own farm. Majority of the selection criteria 71.4 percent was based up on ducks productivity. The prohibited taboo for the production and utilization of duck is only 33.3 percent very minimum. Majority of 42.96 percent respondent were kept there duck outside the house at night and 39.36 percent of them inside house which was made from wood, basket cage. The major problems cause of duck mortality in the study area were analyzed indicate that of 56.6 percent, and 38.8 percent be by predators and increase of temperature respectively while the rest was by accident and unknown reason. The analyzed range value of 13 – 20, 10 – 30, 2 – 4, 16 – 90, 17 – 80 and 18 – 120 were the minimum and maximum Number of hatched egg per one natural incubation period, Number of times the matured duck hatches in a year, Number of eggs produced annually from less, medium and large productive duck respectively. Majority of about 39% respondent put goats in first important rank followed by duck 22 percent, chicken 20.8 percent, donkey 13.9 percent and 5.00 percent of sheep become ranked last in its importance. Majority of 10 (47.6 percent) and 9 (42.9 percent) the male and female households were get foundation stock through purchasing followed inherited and gift from their relative respectively. In this study it was observed that farmers were used on broody duck and sometime broody hen for hatching eggs. Total number of hatched eggs use broody duck varied 13 to 20 out of 10 to 30 eggs laid/clutch /duck. A total number of ducklings varied that of ranges between from 8 to 13 were survived. Majority of 39 percent and 23 percent of the respondent keep male ducks for meat and saving purpose while for 41 percent and 21 percent of respondents keep female duck for egg production and meat respectively. Majority of the farmer's 33.8%, 24.3% and 20.3% were select breeding stock based on size, disease tolerance and performance respectively. In general this very few and shallow information carried out first time in the country draw attentions of interested people for future detailed study and investigation about domesticated duck in the region. we were recommended that of both on farm and on station research would have be conducted on local duck by any concerned research institutes will be mandatory.*

Keywords: *Village Duck, Farming System, Performances, Gambela, Ethiopia.*

I. INTRODUCTION

Poultry are among the most economical and adaptable domesticated animals, except few places on the globe where climatic conditions make the keeping of chicken flock

impossible (Bishop 1995). Local domesticated birds including chicken and ducks are kept in many parts of the world irrespective of the climate, traditions, life standard, with limited religious taboos relating to consumption of ducks egg and meat (FAO, 2004). According to (FAO, 2016) duck meat

production has been growing in the world in recent time. The same source sources also mentioned that of duck production and consumption is known in many parts of the world and is considered under the poultry industry. The Proportion of duck meat production by continent were 81, 13, 3, 2 and 1 percent in Asia, Europe, America, Africa and Oceania respectively (FAO, 2016).

The indigenous poultry belong to a group of local unimproved breeds commonly found in developing countries and may include mixed (unspecified) breeds resulting from uncontrolled breeding or probably unknown breeds and their potential. Most of the farmers have small land holdings and thus small-scale poultry plays a substantial role in ensuring food security for the family besides assisting in poverty reduction. The importance of village poultry production in the national economy of developing countries and its role in improving the nutritional status and incomes of many small farmers and landless communities has been recognized by various scholars and rural development agencies for the last few decades.

There are huge number of cattle, sheep, goats, horse, donkeys, mules, camels, poultry and bee species in the country. This sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country (CSA 2014/15). The country has about 1.2 million TLU of chickens, of which 95.86% are local (CSA, 2016/17), indicating the significance of indigenous chickens as potential farm animal genetic resources of the country without considering the ducks. Though, it has not been considered in the national accounts, different types of ducks are usually available in different parts of the country especially in Gambella and Benishangul Gumuz regions. The phenotypic characteristic and the unique genetic diversity of those duck resources were largely remained uninvestigated and as well as underexploited except some information mentioned by Solomon Demeke (2005) that a duck farm has recently opened at Chancho area, Oromiya national regional state, by importing day old Ducklings from France.

Ducks have several advantages over other poultry species, in particular their disease tolerance, they are hardy, excellent foragers and easy to herd, particularly in wetlands where they tend to lock together. In most of the world duck production is closely associated with wetland rice farming, particularly in the humid and subtropics. An added advantage is that ducks normally lay most of their eggs within three hours after sunrise as compared with five hours for chickens. This makes it possible for ducks to freely range in the fields by day, while being confined by night. As a lot of scholars have mentioned that Village based poultry production requires less space and investment and can therefore play an important role in improving the livelihood of the poor village family, similarly the ducks can do the same way like chicken. Duck feathers and feather down can also make an important contribution to income. A disadvantage of ducks (relative to other poultry), when kept in confinement and fed balanced rations, is their high feed wastage, due to the shovel-shape of their bill. This makes their use of feed less efficient and thus their meat and eggs more expensive than those of chickens (FAO, 2004).

The unique genetic diversity in these resources has largely remained uninvestigated and underexploited. Documentation of information on the origin and history, farming system and characteristics of animal genetic resources (AnGR) is essential to the design of strategies for their sustainable management and utilization (Nurilgn *et al.*, 2017). Thus a research team from animal biodiversity directorate in Ethiopian Biodiversity Institute (EBI) has made a formal survey on those two potential regions to characterize the production system and performance of village ducks under the existing situation of their natural environment and traditional practices in the community.

II. MATERIALS AND METHODS

A. DESCRIPTION OF THE STUDY AREAS

The study was conducted in Gambella and Benishangul Gumuz regions of South West and North West Ethiopia.

GAMBELLA NATIONAL REGION STATE: is located south west Ethiopia between the geographical coordinates 6°28'38" to 8°34' North latitude and 33° to 35° 11'11" East Longitude, which covers an area of about 34,063 km². About 3% human population of Ethiopia. The Region is bounded to the North, North East and East by Oromia National Regional State, to the South and Southeast by the Southern Nations and Nationalities People's Regional State and to the Southwest, West and North West by the Republic of Sudan. The topography of the Region is divided in to two broad classes, i.e. the Lower Piedmonts between 500 to 1900 masl and the Flood Plains of below 500 m contours John young (1999). According to central statistical authority report (CSA, 2016/17) that the region has total of 7,735 TLU of chicken which is about 0.65 percent of the country total population that is not include domesticated duck in the region.

BENISHANGUL-GUMUZ NATIONAL REGIONAL STATE: is located in the north-western part of Ethiopia has an estimated area of 51,000 km² which accounts about 4.5% of the country total area, and it shares common borders with the National State of Amhara in the east, the Sudan in the north-east, and the National State of Oromia in the south. The state has diverse topography and climate. The later includes the familiar traditional zones - "kola", "dega", and "woynadega". "About 75% of the State is classified as "kola" (low lands) which is below 1500 meters above sea level. The altitude ranges from 550 to 2,500 meters above sea level. The average annual temperature reaches from 20-25°C. During the hottest months (January - May) it reaches a 28 - 34°C. The annual rainfall amount ranges from 500-1800mm. The rainy season spreads through May to October indicated that country profile of Ethiopia (2002). The region has two major river basins, Abay and Akobo with smaller basins such as Dabus, Yabus, Dura, Julia, and Beles with significant potential for irrigation agriculture and hydroelectric power generation. Its natural resources include precious minerals such as gold and copper. According to central statistical authority report (CSA, 2016/17) the region has total of 24,992 TLU of chicken about 2.1 percent of the country total 1.2 million TLU of chicken, which is not include domesticated duck in the region. (The same

parameters should be describe for both Gambela and Benishangul regions like population, altitude, boarder and areas etc.)

B. STUDY TECHNIQUES

The study was conducted in support of the biodiversity centers and regional livestock agencies of the respective regions. The study was made in January 2017 for two weeks. The study sites were selected purposively based up on potential availability of the domesticated duck flocks in the area. Households who kept a minimum of two or above ducks were selected in a similar purposive sampling technique. The survey was carried out through interview using pre-tested semi-structured questionnaires which was supported by focus group discussions and direct observations.

C. DATA COLLECTION AND MANAGEMENT

Production system characteristic data was collected using semi structured and pre tasted questionnaires. The household survey tried to include both older and younger age participant farmers based on FAO (2012) guideline without gender discrimination. 21duck farmers were participated in the study. Additional information were collected from development agents working in selected districts. The data were encoded in SPSS version 9 software and Microsoft office excels 2007. The analyzed result were summarized in table forms to make ease for discussion and explanation with justification.

D. DATA ANALYSIS

Production system characteristic data were analyzed using SPSS software version 9. Descriptive statistics such as frequency and cross-tabulation procedures were employed to analyze farming system and peoduction characteristics. Kruskal-Wallis and binomial test was employed based on the data set that was generated. Quantitative data was analyzed using General Linear Model (GLM) of SAS (version 9.3). Some data were computed using Ranke indexing formula based on the parameters needed. All analyzed data were summarized with convenient tables for farther explanation.

III. RESULTS AND DISCUSSION

A. CHARACTERIZATION OF FARMING SYSTEM

Ethiopian poultry production system is relatively better studied as compared to duck production which is becoming part and parcel of poultry industry in the country. Even if there is scanty information sources for characterizing and investigation of duck farming system, it is very important to collect 1st hand information and document available data in the country in general and study area in particular.

a. THE SOCIO-ECONOMIC SITUATION

The household possession have no significant difference between regions at (P< 0.05) shown in (table 1). More than

52.46 percent of the respondents households headed were by female followed by 28.66 percent headed by male this result confirmed that female farmers are more actively participating in duck farming than the male counterparts. This result is in agreement with Gueye (1998) report that stated 80.6 percent of the chicken flocks in a number of African countries were owned and largely controlled by women. Children also have a role in duck production system in the study area as shown in (table 2 and 3).from the total households involved, farming as an occupation is leading 14 (66.7%) followed by 3 (14.3%) of government employed. The majority (42.96 percent) and (28.66 percent) of farmers interviewed were aged between 31-40 and 15-30 years respectively (table 3). This study result is also supported by FAO (2009) that famers involved in duck production in Cambodia were aged between 40 and 50 years. Of the households interviewed table (3). 42.9 6 percent, 14.36 percent and 19.06 percent are illiterates, 5-8 grade and 9-12 grade respectively in both the regions. Education is the base for development of any sectors, like other farming system duck production system also required certain level of education to enhance the sector.

Region	sex of the respondent	possession in the household				total
		Male hh head	female hh head	son	daughter	
Gambel	male	2 _a (14.3%)	0 _b (0.0%)	2 _a (14.3%)	0 _{a, b} (0.0%)	4 (28.6%)
	female	0 _a 0.0%	8 _b (57.1%)	1 _a (7.1%)	1 _{a, b} (7.1%)	10 (71.4%)
Benishangul gumuz	male	4 _a (57.1%)	1 _a (14.3%)	0 _a	0 _a	5 (71.4%)
	female	0 _a	2 _a (28.6%)	0 _a	0 _a	2 (28.6%)
total		6 (28.6%)	11 (52.4%)	3 (14.3%)	1 (4.8%)	21 (100.0%)

Table 1: The possession of household in the study areas

Each subscript letter denotes a subset of position in the household of the interviewed categories whose column proportions do not differ significantly from each other at the .05 level.

Region	Sex of respondent	major occupation				total
		No work	student	Government employed	farming	
Gambel a	male	0 _a	0 _a	2 _a (14.3%)	2 _a (14.3%)	4 (28.6%)
	female	1 _a (7.1%)	2 _a * (14.3%)	1 _a 7.1%	6 _a (42.9%)	10 (71.4%)
Benisha ngul gumuz	male	1 _a (14.3%)	0 _a	0 _a	4 _a (57.1%)	5 (71.4%)
	female	0 _a	0 _a	0 _a	2 _a (28.6%)	2 (28.6%)
total	male	1 _a (4.8%)	0 _a	2 _a (9.5%)	6 _a (28.6%)	9 (42.9%)
	female	1 _a (4.8%)	2 _a (9.5%)	1 _a (4.8%)	8 _a (38.1%)	12 (57.1%)
total		2 (29.5%)	2 (9.5%)	3 (14.3%)	14 (66.7%)	21(100.0%)

Table 2: The major occupation of the respondents

Each subscript letter denotes a subset of major occupation categories whose column proportions do not differ significantly from each other at the .05 level.

Region	Sex of respondents	age of the respondents					total
		<15	15-30	31-40	41-50	51-60	
Gambela	male	1 _a (7.1%)	2 _{a, b} (14.3%)	0 _b	1 _a (7.1%)	0 _b	4 (28.6%)
	female	1 _{a, b} (7.1%)	3 _{a, b} (21.4%)	6 _b (42.9%)	0 _a	0 _b	10 (71.4%)
Benishangul Gumuz	male	0 _a	0 _a	2 _a (28.6%)	1 _a (14.3%)	2 _a (28.6%)	5 (71.4%)
	female	0 _a	1 _a (14.3%)	1 _a (14.3%)	0 _a	0 _a	2 (28.6%)
total		2 (9.5%)	6 (28.6%)	9 (42.9%)	2 (9.5%)	2 (9.5%)	21 (100.0%)

Educational level of the farmer	Illiterate	Reads and write	1-4 grade	5-8 grade	>= 9 grade
	9 (42.9%)	2 (9.5%)	1 (4.8%)	3 (14.3%)	6(28.5%) 21(100%)

Table 3: Shows the age of respondents in the study areas

Each subscript letter denotes a subset of age of the household head categories whose column proportions do not differ significantly from each other at the .05 level.

region	Land size of crops including fallow land owned in hectare							
	0.5 het	1 het	1.5 het	2 het	2.5 het	3 het	4 het	5 het
Gambela	2	1	1	4	2	3	1	0
Benishan gul Gumuz	1	0	2	1	0	1	0	1
total	3 (14.29 %)	1 (4.8 %)	3 (14.2 9%)	5 (23.8 %)	3 (14.29%)	4 (19%)	1(4.8 %)	1(4.8 %)
Sign.	ns	ns	ns	ns	ns	ns	ns	ns

Each subscript letter denotes a subset of Region categories whose column proportions do not differ significantly from each other at the .05 level, het= hectares

Table 4: Land ownership in hectare/household in study area

b. DUCK HUSBANDRY PRACTICES

The result of analysis of management practices were indicated in (tables. 6, 7, 8, 9, 10). Locally duck is called albet and bat in local language. The ducks are reared on free range and survive mainly by scavenging (52.4 percent), and also many farmers (81 percent) give supplement feed, mainly grain. The average flock size lies between 2 and 23 with mean value of (7.48±5.8) as it is indicated in (table 6). Majority of interviewed farmers reported that they didn't construct shelter for the duck but few made from local material like bamboo, wood, mud and grasses with their indigenous knowledge. The chicks housed together with adults (85.7 percent). The result of this study agreed with the result of characterization of domestic duck production system in Egypt reported that duck houses constructed were 41 percent, 57. 5 percent and 1.2 percent simple, intermediate and improved houses used respectively (FAO, 2009). The majority of participant households (81, 66.7, and 61.7 percent) practices watering, culling and selecting breeding flock respectively. Majority of the selection criteria 71.4 percent is based on ducks productivity. The taboo reported for the production and utilization of duck is only 33.3 percent. Similarly, this result is in agreement with a report by FAO (2009) that selection of duck for breed improvement was 6, 45, 29, 31 and 25 percent of interviewed farmers were reported that they have no selection criteria, have ability of live independently, number of eggs laid, test of meat, and mothering ability of duck respectively in Egypt.

Duck production system is extensive type and in small-scale is a common practice. This fact is also true and mentioned in other developing countries, extensive production in small-scale or family farms is common. Similarly in some countries of south-east Asia more than 80 percent of poultry is kept in small-scale family farms (DINESH *et al.*, 2008) that most of the farmers were not using improved breeds for upgrading the flock. Different production system are practices in the study areas. As indicated in the (table 4b) the majority of the production systems were 52.4, 14.3, 28.6 and 4.3

percent mixed-crop-livestock, pastoralism, agro-pastoral and other respectively.. This study result is similar (FAO 2009) report that reveals 44.6 percent of interviewed farmer's rear large ruminants and 28.6 percent of unimproved duck with main crop of maize and other winter crops in Egypt.

Parameters measured	Frequency (percent)	Total (percent)	
Do you give supplementary feed?	yes	17 (81.0%)	21(100%)
	no	4 (19.0%)	
Do duck scavenging?	yes	11 (52.4%)	21(100%)
	no	10 (47.6%)	
Do you give water to your duck?	yes	17 (81.0%)	21(100%)
	no	4 (19.0%)	
Do you practice culling?	yes	14 (66.7)	21(100%)
	no	7 (33.3)	
Is there any taboo prohibiting?	yes	7 (33.3%)	21(100%)
	no	14 (66.7%)	
Are small duck housed with adults	yes	18 (85.7%)	21(100%)
	no	3 (14.3%)	
Do you select duck for breeding?	yes	13 (61.9%)	21(100%)
	no	8 (38.1%)	
Which factors do you considered?	productivity	15 (71.4%)	21 (100%)
	health	6 (28.6%)	

Table 6: Duck management practices

parameters	Frequency	Percent	
Type of production system	mixed-crop-livestock	11	52.4%
	pastoralism	3	14.3^
	agro-pastoral	6	28.6%
	other	1	4.8%
Total	21	100%	
Type of livestock management	extensive	15	71.4%
	semi-intensive	5	23.8%
	intensive	1	4.8%
Total	21	100%	
Name of the duck in local language	albet	6	28.6%
	bat	15	71.4%
Total		100%	

Table 7: Type of production and livestock management

Majority of the respondents 42.96 percent were kept there duck outside the house at night while 39.36 percent of them keep inside the basket cage, which was made of wood. As the result of this study indicated in (table 8) that the different parts of the house is made of different materials such as iron sheet, wood, plastic and mud. Majority 52.46, 57.26 and 56.96 percent respondents aid that roof, wall and floor of duck house made of from plastic, plastic plus wood, and wood respectively. Some of the respondents did not know where their duck rest at night.

Majority of the feed source 42.9 and 33.3 percent were from supplementary and scavenging.. Majority of the respondent indicated that 38.1, and 33.4 percent provide the

feed on the ground and through container with water. Some critical challenges in the area to practice duck production were shown in (table 10). Young duck is given first priority in supplements and then followed by adult male. This is the fact that kids need more care than adult in any circumstances. Duck eat all kind of feed but mostly used grain, vegetables, crop residues and home leftover. This makes the duck to have better feed alternatives

The major problems for duck mortality in the study area were analyzed and found out that 56.6 percent and 38.8 percent caused by predators and high temperature respectively. While the rest was by accident and unknown reason. This study result is similar with study carried out in Cambodia reported by FAO (2009) that 42 percent of respondents recognized mortality was caused by disease followed by predators and unknown reason. The same sources also reported that 26 percent of the respondents' visit veterinary services while 72 percent did not in Cambodia.

where do your duck rest at night	Frequency	Material used	Part of house			
			roof	material	wall	material floor
a room inside the house made from wood, basket cage	8 (39.3%)	iron sheet	6(28.6%)	iron sheet	4(19.0%)	wood 13(56.9%)
in the house purposely made for duck separately	3 (14.3%)	wood	3 (14.3%)	Grass/bush	2(9.5%)	Mud 9(42.9%)
Outside/around human house.	9 (42.9%)	plastic	9(52.4%)	Wood + plastic	12(57.2%)	
I don't know where they rest	1 (4.8%)	Wood + mud	3 (14.3%)	Stone + mud	3(14.3%)	
Total	21(100%)		21(100%)		21(100%)	

Table 8: Duck housing facility and material used for different parts of the house

List of factors considered in questions	List of possible answers given	Frequency (percent)
From Where do you get duck feeds?	own scavenging	7 (33.3%)
	From supplementary feed given	9 (42.9%)
	own scavenging + from supplementary feed	3(14.3%)
	get from mill house	2 (9, 5%)
How frequently do you feed daily?	morning	2 (9.5%)
	afternoon	1 (4.8%)
	freely	11(52.3%)
	Moring + evening	5 (23.8%)
	Moring + evening + afternoon layers	2 (9.5%)
Which class of duck receiving supplementary feed?	kid duck	10 (47.7%)
	Adult male	6 (28.6%)
	kid duck laying + adult male	1 (14.3%)
What Main reasons for mortality?	all	2 (9.5%)
	Predator	10 (56.6%)
	Accident	2 (5.7%)
	increase of temperature unknown	8 (38.8%)
What do you do when duck became sick?	Treat them my self	3 (14.3%)
	Call in the vet.	5 (23.8%)
	Kill them	2(9.6%)
	no treatment	2 (9.5%)
	No response	9 (42.9)
Total		21(100%)

Table 9: Results of the analysis of feed and feeding practices, disease and its treatment practices

Ways of provision feed for duck	Frequency (percent)	reason for not giving supplementary feed	Frequency (percent)	types of supplementary feed	Frequency (percent)
put give container	4 (19.0%)	lack of awareness for supplementary feed	2 (9.5%)	grains	2 (9.5%)
throw feed on ground	8(38.1%)	unavailable	2(9.5%)	vegetation	2 (9.5%)
throw feed on ground+ put inside the water	7(33.4%)	lack of cash	6(28.6%)	crop residue	2 (9.5%)
Put give container + put feed inside water	2(9.5%)	Lack of awareness for supplementary feed + unavailable sup. feed + expensive + lack of cash	11(52.4%)	Vegetable + leftover + residue	5 (23.8%)
				Grain + leftover	9 (42.9%)
water source		Constraints to keep duck in the area			
well	3 (14.3%)	- sanitary problems (spoil environment)	S 4 (19%)		
river	6 (28.6%)	- high consumption and Shortage of feed	H 4 (19%)		
tap water	6 (28.6%)	- culture (taboo)	C 2 (9.6%)		
river + tap water	2 (9.5%)	- problem of house.	P 3 (14.3%)		
Container + well + rain water	4(15.1%)	- predator problems + accident	p 8 (38.1%)		
Total	21(100%)	Total	21 (100%)		

Table 10: Provision of feed and water, constraints to keep duck, reason for supplementation and type of feed

B. PRODUCTIVE AND REPRODUCTIVE PARAMETERS

The productivity of matured duck which is measured by the number of hatched egg per natural incubation, number hatches in a year, number of eggs produced annually were analyzed in (table 11). The results minimum and maximum range values of 13-20, 10- 30, 2-4, 16-90, 17-80 and 18-120 Number were indicated that of hatched egg per one natural incubation period, Number of times the matured duck hatches in a year, Number of eggs produced annually from less, medium and large productive duck respectively. As the above result indicated that from 13 (100 percent) of minimum hatched ducklings are expected to survival about 10 (77 percent) up to adult age. while the maximum of 20 (100 percent) hatched ducklings have been survived about 3 (30 percent) in which indicated that of number of hatched egg increase while the ducklings survival rate is decrease alarmingly in Number of hatched egg per one natural incubation period, Number of times the matured duck hatches in a year, Number of eggs produced annually from less, medium and large productive duck is might be due to less capacity of natural broody hen to care the kids within its capacity and more exposed for external factors cause in to early death of ducklings.

In general artificial incubation is not practiced by the owners of indigenous duck in the area. In this study it was observed that farmers were used on broody duck and sometime broody hen for hatching eggs. Total number of hatched eggs use broody duck varied 13 to 20 out of 10 to 30 eggs laid/clutch /duck. A total number of ducklings varied from 8 to 13 were survived. Total number of hatches per year range 2-4 hatches. A similar study made in Cambodia reported by FAO (2009) indicated that average number of cycle per year of clutch ranges 1.6 to 3.6 times and average number of egg per clutch ranges 13 to 15 eggs/per duck were agreed with the result of this study. The present study confirmed that productive ducks produced 18-120 eggs per year in Gambela region while no accurate information was provided by respondents in Benishangul – Gumuz region (table 11).

Region	No of egg hatched /1/h	Number of duck surviving to adulthood	Average number of eggs laid/single clutch period	N ^o hatches /year	eggs ph/year less productive	eggs ph/year medium productive	eggs ph/year highly productive	
Gambela R	N (Mean ± Std. D) Min - Max Std. E. Mean	13 (23.38 ± 8.59) 20 - 120 30.97	10 (15.40 ± 2.99) 15 - 30 9.45	11(16.18 ± 2.87) 25 - 30 9.51	10 (3.80 ± 1.3) 3 - 4 .42	5(46.40 ± 8.45) 16 - 60 18.89	5 (60.20 ± 11.54) 17 - 80 25.81	6 (90.67 ± 15.40) 18 - 120 37.73
Benishangul gumuz R	N (Mean ± Std. D) Min - Max Std. E. Mean	7(10.14 ± 14.28) 13 - 36 5.39	7 (2.86 ± 1.67) 10 - 13 .63	6 (4.17 ± 2.31) 10 - 15 .94	7 (3.43 ± .78) 24 .29	2 (67.50 ± 31.81) 45 - 90 22.50	no no no	no no no
Total	N (Mean ± Std. E. M) Min - Max Std. Deviation	20 (18.75±5.96) 13 - 20 26.65	17 (10.24±2.32) 8-13 9.58	17 (11.94±2.34) 10 - 30 9.65	17 (3.65±.61) 2 - 4 .61	7 (52.43± 8.55) 16 - 90 22.64	5 (60.20± 1.54) 17 - 80 25.81	6 (90.67±15.40) 18 - 120 37.73

Note: N (Mean ± Std. D) = total number of observation mean of observation plus or minus standard error of observation from the mean observation. No of egg h/1/h = Number of hatched egg per one natural incubation period, No hatches/year = Number of times the hen hatches in a year albelt duck, eggs ph/year less p= Number of eggs produced annually from less productive albelt duck, eggs ph/year medium p= Number of eggs produced annually from medium albelt duck, eggs ph/year highly p= Number of eggs produced annually from large productive lalbelt duck.

Table 11: The productivity of matured duck in the study area

There was a limited data available about the productivity of duck in both regions to have a clear image but from limited data gathered, from Gambela region the productivity trait mean value indicated in (table .12) and The average mean value of 87.000 ± 24.062 and 14.000 ± 3.808 was found to be number of eggs produced per year and average number of eggs laid in a single clutch period per duck in the region respectively. This is very big number of eggs produced per year and number of laid eggs per clutch as compared local indigenous chicken of the country which is 65 eggs per year and 10 eggs per clutch respectively.

Variable	Mean± Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
Number of duck in the house hold	7.48 ± 5.80	2.00	23.00
Number of duck hatched per one natural incubation period	8.75 ± 3.90	3.669	21.169
Number of duck surviving to adulthood albelt duck	16.75 ± 2.14	9.952	23.548
Average number of eggs laid in a single clutch period duck	14.00 ± 3.81	1.882	26.118
Number of times the hen hatches in a year albelt duck	3.75 ± 0.25	2.954	4.546

Number of eggs produced annually from less productive duck	43.00 ± 9.98	11.229	74.771
Number of eggs produced annually from medium albelt duck	55.25 ± 13.46	12.407	98.093
Number of eggs produced annually from large productive a duck	87.00 ± 24.06	10.423	163.577

Table 12: The list of mean values of the variables in the Gambelia region

C. PURPOSE OF KEEPING DUCK

The purpose keeping duck in the study area was analyzed and indicated in (table 14). The analysis of the purpose of keeping duck considered meat, egg, breeding and saving purposes. Majority, 39 and 23 percent of the respondents keep male ducks for meat and saving purposes respectively, while 41 and 21 percent of respondents keep female duck for egg production and meat respectively. This study result is similar with a report from Vietnam by FAO (2006) revealed that 11.7 and 43.5 percent of respondents kept duck for egg and meat purposes and out of it 40, 20 and 19 percent of the products were intended for self-sufficiency, intermediate and semi-intermediate farms respectively. So that keeping duck are very useful for fulfilling the household nutrition requirements and the duck help to serve as insurance in case of emergency.

List of economic parameters	keeping male duck				index (percent)
	1st	2 nd	3 rd	4 th	
meat	16	3	1		0.39 (39%)
egg	2	1	3		0.17(17%)
breeding	2	8	3		0.22 (22%)
saving	1	9	4		0.23 (23%)
Total	21	21	2	1	(100%)

Table 14: Shows the purpose of keeping male and female duck ranking index

D. LABOR DIVISION OF HOUSEHOLD MEMBERS IN DUCK REARING ACTIVITY

The study analyzed the labor division with sex and age (table 15). The study considered analysis of different responsibilities like purchasing, selling, caring, and setting eggs for natural incubation. The result revealed that majority of activities were handled by female aged above or equal to 18 year. From all interviewed farmers 77.8 and 47.6 percent of purchasing and collecting eggs were the responsibility of adult female. This result is agreed with labor division reported in Vietnam which was two of third labor is allocated from family every day while few labor supported from external help (FAO, 2006) and from interviewed farmers about of 72 percent were responsible labor from parents for feeding and harvesting eggs . Selling eggs and live duck mainly of 67.8, and 72.3 percent responsible to parents of both sex while 9.8 and 7.9 percent responsible to children respectively. For cleaning duck houses, 42.8 percent is the responsibility of female kids aged less than 18 years of age. However, we can realize that of very family have its own work share in duck production activity path in the study area.

List of responsibility	Members of the household participating in the activity categorize with age				total
	male kids < 18	Female kids < 18	male > or = 18	Female > or = 18	
purchasing duck	-	-	5 (22.2%)	16(77.8%)	21(100%)
selling duck	2(9.5%)	1(4.8%)	8 (38.1%)	10 (47.6%)	21(100%)
caring sick duck	1(4.8%)	1(4.8%)	8(38.1%)	11(52.4%)	21(100%)
feeding duck	2(9.5%)	1(4.8%)	8(38.1%)	10 (47.6%)	21(100%)
Harvesting/collecting egg	2(9.5%)	1(4.8%)	8 (38.1%)	10 (47.6%)	21(100%)
selling eggs	2 (9.5%)	1(4.8%)	8 (38.1%)	10 (47.6%)	21(100%)
Setting eggs for natural incubation and hatching	2(9.5%)	2(9.5%)	7(33.3%)	10(47.6%)	21(100%)
cleaning the house	5(23.8)	9 (42.8%)	6 (28.6)	1(4.8%)	21(100%)

Table 15: Labor division (responsibility) of household members in duck production activity

E. SOURCE OF FOUNDATION STOCK, REPLACEMENT AND PROHIBITION OF DUCK PRODUCT CONSUMPTION

This study was also analyzed the sources of foundation stock, replacement stock and prohibition of consuming duck product (meat and egg) in table (16). The majority of households 47.6 and 42.9 percent get male and female foundation stock through purchase and inherited respectively. This study result agreed with report of (FAO, 2009) which revealed that 70.7 percent of interviewed farmers in Cambodia purchased breeding parent from neighbor or commercial market. While majority of male and female replacement stocks of 47.6 and 76.2 percent of the respondents sourced from natural hatchery while the rest from selection of their stock. Among the interviewed farmers about 50 and 37.5 percent were mentioned the problem of prohibition of consumption due to lack of awareness and due to religious taboos respectively. Creating awareness on those issues and creating more opportunity to utilize the duck product through value addition would have huge effect to enhanced production and sustainable utilization duck in the area.

sources	foundation breeding male	foundation breeding female	sources	male for replacement breeding stock	female for replacement breeding stock	sources	prohibition duck consumption
	Frequency Percent	Frequency Percent		Frequency Percent	Frequency Percent		Frequency Percent
purchased	10 (47.6%)	9 (42.9%)	purchased	3 (14.3%)	2(9.5%)	poor a wearing	10 (50%)
inherited	7(33.3%)	5 (23.8%)	inherited	4 (19.0%)	-	hoof closed (religion)	8 ((37.5%)
other	2(9.6%)	1(4.8%)	hatching	10 (47.6%)	16(76.2%)	culture	3 (12.5%)
gift	2(9.5%)	5 (23.8%)	other	1 (4.8%)	1 (4.8%)		
Sudan	1(4.8%)	1(4.8%)	Purchase + hatching	3 (14.3%)	2(9.5%)		
Total	21(100%)	21(100%)	Total	21 (100%)	21 (100%)		21 (100%)

Table 16: Source of foundation, replacement stock and prohibition duck consumption

F. THE SELECTION CRITERIA FOR BREEDING PURPOSE

Framer select their animals based on their own criteria which was indicated in (table 17). Farmers involved in this study believed that some traits are very important to select breeding parent. Therefore, they were practicing selection of their breeding duck based on size, color, performance (weight gain and egg production), disease tolerance and maternal performances of females. Majority of the interviewed farmers of 33.8, 24.3 percent and 20.3 percent select breeding stock based on size, disease tolerance and performance respectively. Traits like color and maternal performance accounted 13 and 8.1 percent be considered in lesser extent respectively. This study revealed that duck of the same age and sex have relatively better size, tolerant to disease and gain better performance from the population.

trait	Ranking 1st	Ranking 2nd	Ranking 3d	index	percent
size	3	7	2	0.337837838	33.8%
color	2	1	2	0.135135135	13.5%
Performance (weight)	2	3	3	0.202702703	20.3%
disease-tolerance	3	2	5	0.243243243	24.3%
maternal performance	2			0.081081081	8.1%
total	12	13	12	1	100%

Index = sum of (3 X number of household ranked first + 2 X number of household ranked second + 1 X number of household ranked third) give for each selection criteria divided by sum of (3 X number of household ranked first + 2 X number of household ranked second + 1 X number of household ranked third) for all selection criteria

Table 17: Shows purpose of breeding of duck ranking index

G. THE OPPORTUNITY AND CONSTRAINTS OF DUCK PRODUCTION IN THE AREA

The opportunities and some basic constraints were analyzed and listed (table 18). The analysis considered some traits like disease tolerances, low production cost, high egg production with limited resources, species availability, and purposes for as a source of income and alternative source of animal protein for the family. Duck production in the study area has a lot of opportunity in which about 33.3, 23.8 and 14.4 percent of respondents mentioned duck requires low production cost, purposes for income source and used as source of animal protein respectively. There were no problems with sources of foundation stock since people have the habit of gift and some inherited from the family. The respondents were asked to mention the reason why duck production shows decreasing trend in the area and accordingly 47.5, 19, and 14.4 percent of respondents confirmed that breed not easily available, declining interest of the farmers and market problems were mentioned respectively. Even though there are many opportunities, there were some constraints mentioned including poor infrastructure and lack of training in duck production and utilization in study the area.

Factors be considered	Frequency (percent)	constraints	Frequency (percent)
Opportunity	disease tolerant	2 (9.5%)	Problems of duck market Availability of substitute /other source of meat 11 (52.4)
	low production cost	7 (33.3%)	poor infrastructure 8 (38.1%)
	high egg production	2 (9.5%)	poor understanding of community 2 (9.5%)
	Species availability	2 (9.5%)	
	acceptance for income source	5 (23.8%)	
	Used as source of animal protein	3 (14.4%)	
total	21 (100%)		21 (100%)
Trends of duck production in the area	Increased	6 (28.6%)	Where is Source of duck breed? inherited 2 (9.5%)
	Decreased	8 (38.1%)	Neighbor market 4 (19.0%)
	Stable	1 (4.8%)	Gift 4 (19%)
	unknown	6 (28.6%)	Own 2 (9.6%)
	total	21 (100%)	incubated purchase from Sudan 4 (19%)
Reasons to decreasing trends	Breed is not easily available	10 (47.5%)	When do breed introduced 1st into this area? 6 year 1(4.8%)
	Less or no community aware	2 (9.6%)	Last 10 years 19 (90.5%)
	Declining interest of the farmers	4 (19%)	Last 11-20 years 1(4.8%)
	disease	2 (9.6%)	
	Culling plus market problems	3 (14.4%)	
	total	21 (100%)	

Table 18: Shows opportunities, trend of duck number, reason for decreasing trend, constraints source of duck breed and 1st introduction to the area

IV. CONCLUSION AND RECOMMENDATION

This study was aimed to collect firsthand information as well as documented about domestic duck production system in some extent of the region. This very few and shallow information carried out first time in the country draw attentions of interested people to future detailed research and investigation will be carried on domesticated duck in the region.. Even if we have scant (21) household number of sample involved for interview with different reason while we are recognize that of provided pieces of information was something better than nothing.

Thus this study were identified duck production system of the area like socioeconomic status, husbandry practice of duck in the region, labor division, position, and educational level of farmers, ranking importance of livestock in the area were identified. Also purpose of duck keeping, sources of foundation stock and selection criteria for breeding and replacement stock were identified. Furthermore, this study could tried to identify some of points about the opportunity and constraints of duck production in the regions were considered.

Duck production is an emerging activities which has not well adapted like other chicken production in the region. If the

people in the region have got awareness training and extension accesses on improvement domestic duck production and utilization likewise other agricultural activity, overall production and productivity of poultry in those region could increase significantly. Then nutrition requirement gap of people would have been fulfilled and supported with duck product. It is very important to show specific site for future researcher in which local duck were available in each regions. However very few and limited number of observations per area were not comparable with each other, the study identified some potential site in which duck production practice have been carried out like that of Angnuwa, Abebeo, Goge, and Gambela city in Gambela regions and kumuruk, Fanguso, and skerkole and Guba/mankush in Benishangul Gumuz region respectively. Educational levels of the community should be increased and intensified. Since all family member has contribution in duck production in which all family member of the households should be well trained about the production and sustainable utilization of domesticated duck in the regions.

This study used very scant sample size of respondents for collecting information and documenting it with various reasons. Therefore this pieces of study is not suffices enough to give detail information to recommend for farmers and for development agents for further utility of duck product in the region. Thus,

- ✓ The people except who producing duck do not have any concerns with this bird before this study have been conducted by EBI. Even central statistical authority of Ethiopian cloud not yet considered as domesticated animals genetic resources in the area and very important economical wealth for the community which required attention with them.
- ✓ Detailed liable study on Production and productivity of indigenes local duck will be very mandatory both on farm and on-station level.
- ✓ Assessment and improvement study of management and husbandry practices especially on feed resources of duck has to be take place with shorter period of time in near future.
- ✓ Government officials and expertise has to give attention to this genetic resource in the region to improve and enhance the economic status of people especially youth and women in the region.
- ✓ Extension programs and technology package has to be implemented for local duck likewise other livestock to maximize livelihood of the community in the regions
- ✓ Central statistical authority of Ethiopia due consideration to duck as one of animal's genetic resource in the regions during in its conducting resource senses program in the region.
- ✓ Setting and designing Regular awareness creation program has to be carried out by concerned institution or concerned body for all stockholders especially for duck owner farmers.
- ✓ Alternative Conservation and sustainable utilization programs of local duck has to be developed and implemented to secure from dangerous threat.

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