

# Characterization of Village Chicken Production and Marketing Systems in Meket District, North Wollo Zone, Amhara Regional State, Ethiopia

T.D. Assefa<sup>1\*</sup>, M.A. Ewunetu<sup>2</sup>

<sup>1</sup>Oda Bultum University, Collage of agriculture, department of animal science, Chiro, Ethiopia

<sup>2</sup>University of Gondar, faculty of Veterinary Medicine, Department of Animal production and extention, Gondar, Ethiopia

\*Corresponding Author: Tarekegn Demeke\_tarekedeme@gmail.com, Tel.: +251-91945-1148

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**Abstract-** The study was conducted to generate comprehensive information on village chicken production and marketing systems in Meket district of North Wollo Zone, Ethiopia. The study was performed based on household survey and group discussion. For household survey, twelve kebeles were purposively selected and a total of 120 households were involved. Majority of households (80.3%) were kept indigenous chicken ecotype. The flock size of chicken per household was  $8.79 \pm 1.4$  (range 0 to 12). Most of the households (73.3%) were practiced backyard chicken production systems. The purpose of chickens, in order of importance were income generation (36.7%), egg production (20.0 %), egg hatching (16.7%), home consumption (10.0%) and for religious ceremonies (8.3%). The majority of the households (60%) practiced extensive management systems. Most of households were not prepare a separate house for their chicken (85%). The entire households were hatching the egg by using natural incubation. Most of the households were sold their chicken through formal market (63.3%) for the consumers (83.3%). The average age at first mating of cockerels and age at first egg of pullets were 24.8 weeks and 7.1 months, respectively. The average number of egg laid /clutch and annual productivity of local hens in the study district was  $13.1 \pm 0.8$  and  $52.3 \pm 0.9$  eggs, respectively. Religious/culture/holidays and seasonal diseases outbreak were highly associated with marketing and consumption of chicken products. New castle disease was the major infectious diseases affecting productivity and survival of village chicken. 79.7% of chicken owners reared birds mainly during dry season, when the risk of disease outbreak and predation is low.

**Keywords-** Backyard, chicken ecotype, Marketing practice, production systems

## I. INTRODUCTION

In Ethiopia chickens are the most widespread where almost every rural family owns chickens, which contribute greatly to supply of eggs and meat [1]. Rural chicken in Ethiopia represents a significant part of the national economy in general and the rural economy in particular and contribute to 98.5% and 99.2% of the national egg and chicken meat production, respectively [2, 3]. Poultry production system in Ethiopia is indigenous and an integral part of farming system and predominantly prevailing in the country and it is characterized by small flock, minimal input and unorganized marketing system [4]. About 59.49 million chicken heads with about 90.9%, 4.7% and 4.4% of chicken population are indigenous, hybrid and exotic breeds are found in Ethiopia [5]. Out of these heads, about 33.5% are found in Amhara region. Generally, in order for decision-makers to address poultry related challenges in production and marketing and to improve the nutrition, food security and livelihood of rural households by enhancing the benefits from poultry through appropriate production and marketing extension, it is essential to generate appropriate technologies which are socially acceptable, environmentally sound and economically

feasible. The main advantages of chicken marketing research are defining the needs and nature of customers and their ability and desire to buy, scanning the business environment, gathering needed information for decision-making, reducing risk, helping in production planning and monitoring and controlling marketing activities [6]. Access to markets affects the price and transaction costs and is influenced by access to infrastructure and information [7]. Although there are some studies conducted on characterization of chicken production systems in some locations in Ethiopia, they are not comprehensive enough and did not relate production and productivity with marketing. Some of these studies were also site specific. Characterization of the prevailing chicken production and marketing system is therefore an essential prerequisite to bring this into effect. Therefore, this paper synthesizes studies on indigenous chicken production and marketing systems from Meket district, North Wollo Zone, Ethiopia.

## II. RELATED WORK

Indigenous chicken production and marketing: characteristics and opportunities for market oriented development [8]. Village chicken production systems and

constraints in Lemo district, Hadiya Zone, Ethiopia [9]. Characterization of village chicken and marketing systems in the selected district of North Western Amhara Region, Ethiopia [15]

### III. METHODOLOGY

#### Description of the Study Area

The study was conducted in Meket district, which are geographically located in North Wollo Zone, Amhara Regional State, Ethiopia. The administrative center of Meket district is Filakit, and is situated at about 660 km from Addis Abeba and 139 km from Weldiya. The altitude ranging between 1500 and 3500 meters above sea level. 65% of the total area of the district is consisting of gorges and valleys. While, 7% is mountains and the remaining 28% is plain land. Ninety two percent of the people earn their livelihood from agriculture. The district has three ecological or climatic regions: 25% lowland, 55% midland and 20% high land. The temperature of the district varies 22c° to 7c°. The total sheep population in Meket district was 139287 [10].

#### Data Collection Methods

Both primary and secondary sources of data were used for the study. To collect the primary data, a semi-structured questionnaire was designed. The questionnaire was pre-tested before administration and some re-arrangement, reframing and correcting in accordance with respondent perception was done. The questionnaire was administered to the selected households or representatives by a team of researchers. Group discussion was also conducted with extension workers, model farmers and Developmental Agents (DAs) since it is believed that such individuals have better information about the overall production potential of the chicken as well as the production system, husbandry practice and marketing systems. The secondary data was collected from the study district office of livestock and fishery resources to complement the production system and agro ecology along with climate, vegetation cover, topography, human population and livestock population.

#### Sampling techniques and sample size

The sampling method employed for this study was purposive sampling technique, which was based on the potential of chicken population/production. Accordingly twelve sampling sites or rural 'kebeles' (lowest local administration unit in Ethiopia) were selected in the study district, based on chicken flock size per household, suitability of the area for chicken production and accessibility. From each rural kebele, 10 household heads having indigenous chicken ecotype were randomly selected for interview. Generally, 120 households were selected from the twelve sampling sites (rural kebeles) for interview.

#### Data Management and Statistical Data Analysis

The data collected from each study site was checked for any error and corrected during the study period, coded and entered into computer for further analysis.

**Questionnaire data:** Data collected through questionnaire was described by descriptive statistics using Statistical Package for Social Sciences [11]. Chi-square was employed when required to test the independence of categorical variables and to assess association between levels of categorical variables. Ranked data were evaluated based on calculated indices. An index was calculated to provide overall ranking for qualitative data such as constraints of chicken production, and common chicken diseases in the study area according to the following formula: Index =  $\Sigma$  of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by  $\Sigma$  of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all qualitative variables considered.

### IV. RESULTS AND DISCUSSION

#### General Household Characteristics in the Study Area

The majority of the respondents in the study area were female (66.7%). The proportion of male respondents was clearly low (33.3%). The largest proportions of household heads in the study area (70%) were illiterate. Low education level might have effect in implementing intensive chicken production like keeping records, distribution of exotic chicken ecotype and implement improved management practices. Thus teaching them would be beneficial to use their indigenous knowledge in scientific way and easily adopting improved technologies like hatching by incubator, selection of high productive chicken and feeding well ration feed.

Table 1: Sex and education background of respondents in the study area

Description of demography		
Demography of households	Frequency (N)	Percent (%)
<b>Sex</b>		
Male	40	33.3
Female	80	66.7
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Education background</b>		
Illiterate	84	70.0
Primary school (1-4)	20	16.7
Elementary school (5-8)	4	3.3
Secondary school (9-10)	8	6.7
Preparatory school (11-12)	4	3.3
<b>Total</b>	<b>120</b>	<b>100.0</b>

N= number of households, %=percent

### Chicken Production Systems

As illustrated in Table 2, the majority of households in the study area were kept indigenous chicken ecotype (80.3%). Based on the information obtained from the respondents, the major objective of raising chicken in the study area was income generation (36.7%), income egg production (20.0%), egg hatching (16.7%), home consumption (10.0%) and for religious ceremonies (8.3%). Similarly, village households in tropics like Ethiopia keep their chicken for purposes other than for reproduction, sale and consumptions, in particular for their socio-religious functions at home, gifts, for ceremonies and chicken are given as or received to show or to accept a good relationship or to say thanks for favor or help [12]. According to the information obtained from the respondents, most of the household in the study area was practiced backyard chicken production systems (73.3%). Such production systems may result in slow growing, and poor layers of small sized eggs. Village chickens however are ideal mothers, good sitters, hatch their own eggs, excellent foragers and have immunities to resist common poultry diseases

Table 2: Chicken Production systems in Meket district

Description		
Chicken Production systems	Frequency (N)	Percent (%)
<b>Do you have exotic chicken</b>		
Yes	23	19.7
No	97	80.3
<b>Sources of exotic chicken</b>		
Purchased from unknown sources	72	60
Gift from NGOs	8	6.7
Gift from governments	40	33.3
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Purpose of keeping roosters</b>		
For meat production	24	20.0
For sale	4	3.3
For breeding purpose	92	76.7
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Major objectives of raising chicken</b>		
Home consumption	12	10.0
Income generation	44	36.7
Egg production	24	20.0
Egg hatching	20	16.7
For religious ceremonies	10	8.3
<b>Total</b>	<b>120</b>	<b>100.0</b>
<b>Chicken production systems</b>		
Backyard chicken production	88	73.3
Small scale chicken production	20	16.7
Large scale chicken production	12	10
<b>Total</b>	<b>120</b>	<b>100.0</b>

### Flock size and Structure

As illustrated in Table 3, the total chicken flock size household (Mean  $\pm$ SE) in the study district was  $8.79 \pm 1$ . In this study as compared to the other age groups hens made a major share ( $4.03 \pm 0.6$ ) followed by young chick ( $2.7 \pm 0.3$ ).

Table 3: Flock structure of chicken in Meket district

Flock composition of chicken	Mean $\pm$ SE	Range
Young chicks	2.7 $\pm$ 0.3	0-12
Pullets	0.92 $\pm$ 0.2	0-7
Cockerels	0.62 $\pm$ 0.2	0.3
Hens	4.03 $\pm$ 0.6	1-48
Cocks	0.52 $\pm$ 0.1	0-3
<b>Total</b>	<b>8.79<math>\pm</math>1.4</b>	<b>1-48</b>

### Chicken management systems

As illustrated in Table 4, the majority of the households in the study area were practiced extensive management systems (69.2%). Based on the information collected from the respondents. Most of the households in the study area were have not a separate chicken house (85%). According to the information obtained during the survey, the popular types of housing system in the study area were semi-intensive or restricted range (63.3%). Most of the household in the study area was cleaned their chicken house (79.2%).

Table 4: Chicken management systems in the study area

Description		
Chicken management systems	Frequency (N)	Percent (%)
<b>Types of management</b>		
Extensive	83	69.2
Semi-intensive	23	19.2
Intensive	14	11.6
<b>Total</b>	<b>30</b>	<b>100.0</b>
<b>Do you have separate chicken house</b>		
Yes	18	15
No	102	85
<b>Types of housing systems</b>		
Extensive/free range	83	69.2
Semi-intensive/restricted range system	23	19.2
Intensive/deep litter/cage	14	11.6
<b>Total</b>	<b>30</b>	<b>100.0</b>
<b>Do you practiced cleaning of chicken house</b>		
Yes	95	79.2
No	25	20.8

### Feed resources, feeding stratagem and watering

Based on the information obtained from the respondents, the majority of the households in the study area were providing supplementary feed and water for their chicken (94.2% and 100%, respectively). As illustrated in Table 5, the main reason for providing supplementary feed was to increase egg yield (74.3%) followed by shorting of broodiness (18.7%). Similar to the current finding, [13] reported that, as chicken requires more feed and results in loss of broodiness. Based on the information obtained from the respondents, the most widely used ingredients as a supplementary feed was Maize (74.5%) followed by Sorghum (8.0%). Most of the households were provide water once a day (79.2%). The current finding was similar to the report of [14] who reported that, feeds and feeding

systems were potentials for intervention since the majority of the farmers practiced supplementary feeding with locally produced feeds.

Table 5: feeding and watering practice in the study area

Description		
Feeding and watering practice	Frequency (N)	Percent (%)
<b>Do you provide supplementary feed for your chicken</b>		
Yes	113	94.2
No	7	5.8
<b>Why do you provide supplementary feed for your chicken</b>		
To increase egg yield	84	74.3
To increase meat yield	4	3.5
To shorting broodiness	21	18.7
To increase egg yield and shorting broodiness	4	3.5
Total	113	100.0
<b>Feed ingredients used as a supplementary feed</b>		
Wheat	4	3.5
Barely	8	7.0
Sorghum	9	8.0
Maize	84	74.5
Mixture	8	7.0
Total	113	100.0
<b>Do you provide water for your chicken</b>		
Yes	120	100.0
No	-	-
<b>How many times per day</b>		
Once	95	79.2
Twice	18	16.0
Three times or more	7	5.8
Total	120	100.0

**Incubation and hatchery management of chicken**

Based on the information obtained from the respondents, the entire households in the study area were hatching the egg by using natural incubation. According to the information obtained during the survey, all the selected households were use broody hens as a natural incubation. As illustrated in Table 6, most of the households were used Teff straw during hatching of the egg by natural incubation/broody hens (40%) and the overall incubation period of chicken in the study area was 21.4±0.19 days.

Table 6: Incubation and hatchery management of chicken in the study area

Description		
Incubation and hatchery management	Frequency (N)	Percent (%)
<b>How do you hatching the egg</b>		
By using natural incubation	120	100.0
By using artificial incubation	-	-
<b>What types of chicken do you use as a natural incubation</b>		
Broody hens	120	100.0

Non broody hens	-	-
Others	-	-
<b>Which types of materials do you use during natural incubation</b>		
Clay pot and straw bedding	12	10.0
Clay pot only without bedding	8	6.7
Teff straw	48	40.0
Wheat straw	28	23.3
Barely straw	24	20.0
Total	120	100.0
<b>The incubation period of chicken in the study area</b>		<b>Mean±SE</b>
		21.4±0.19

N=Number of Household, SE=Standard Error

**Productive performances of local chicken ecotype**

The current study indicates, the average matured weight of local hens and cocks in the study area was 1.13±0.17 and 1.63±0.32 Kg, respectively. As illustrated in Table 9, the current result was higher than the report of [15] who reported that the average weight of local hens and cocks found in north western Amhara region was 1.12±0.021 and 1.4±0.31 Kg, Respectively. This indicated that, there is enough grain availability in Meket districts.

Table 7: average weight of local hens and cocks under farmer's management condition (N=240 Birds)

Parameters	N=240	Rang
	Mean±SE	
Average weight of local hens (Kg)	1.13±0.17	0.5-2.1
Average weight of local cocks (Kg)	1.63±0.32	0.6-2.7

N=number of chicken used for body weight measurement, SE=Standard Error

**Reproductive performances of local chicken ecotype:**

The average age at first mating of cockerels and age at first egg of pullets in the study area was 24.8 weeks (6.2 months) and 7.1 months (28.4 week), respectively. Similar studies by different authors also indicates that, the age at sexual maturity of female birds in Tanzania were 28 weeks [16], 24 weeks in Mali [17], 32 weeks in Sudan [18] 28 to 36 weeks in Benin [20].The average number of egg laid /clutch and annual productivity of local hens in the study district was 13.1±0.8 (range 9 to 19) and 52.3±0.9 (range 29 to 98) eggs, respectively. Similar to the current finding, [20] reported that the average number of eggs/clutch in northwest Ethiopia was ranges from 9 to 19.

Table 8: performance of local hens under farmer's management condition (N=240)

Parameters	N=120	Range
	Mean±SE	
Egg laid/ clutch	14.3±0.1	9-19
Average number of egg set	13.1±0.8	6-18
Number of egg hatched	10.3±0.2	5-17
Number of chick survived	6.5±0.8	1-11
Survivability percentage	56.7±1.2	24-100
Hatchability percentage	86.3±1.4	54-100
Number of clutch period/year/hen	3.2±0.1	3-6
Egg production /hen year	52.3±0.9	29-98
Age at first mating of cockerels	6.2±0.2	4-8
Age at first egg of pullets	7.1±0.3	6-9

### Chicken marketing systems

Based on the information obtained from the respondents, most of the households in the study area were sold their chicken through formal market (63.3%) for the consumers (83.3%). As illustrated in Table 9, mostly women's were responsible for chicken marketing in the study area (80%). According to the information obtained during the survey, most of the households in the study area were transport their chicken to the market place by hanging by hand (83.3%).

Table 9: Chicken marketing systems in the study area.

Description		
Chicken marketing systems	Frequency (N)	Percent (%)
<b>How do you sell your chicken and chicken products</b>		
Through formal market	76	63.3
Through informal market	36	30.1
Both	8	6.3
Total	120	100.0
<b>How are responsible for chicken marketing</b>		
Man	10	8.3
Women	96	80.0
Children	14	11.7
Total	120	100.0
<b>How to transport your chicken to the market place</b>		
By pack animals	-	-
Hanging by hand	100	83.3
Hanging with stick	20	16.7
Total	120	100.0
<b>To whom you sell your chicken</b>		
For consumers	100	83.3
For retailers	12	10.0
For intimidators	8	6.7
Total	120	100.0

N=number of household

### Major constraints of chicken production and marketing

Based on the information collected from group discussion, religious/culture/holidays and seasonal diseases outbreak were highly associated with production, marketing and consumption of chicken products. Orthodox Christian fasting period were highly related with decreased consumption /demand of chicken and egg fluctuation/seasonality in price of chicken and egg products was the major chicken and egg marketing constraints. The other marketing constraint collected from the respondents, in the study area include low supply (output) of marketable chicken products, presence of limited market outlets, lack of appropriate chicken and egg marketing information, lack of demand during fasting periods, lack of chicken transportation and egg handling facilities, lack of credit and capital to expand chicken production (Table 10).

Table 10: Major constraints of chicken production in the study area

Major constraints of sheep production	District (Meket)			
	Rank			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Index
Low supply of marketable chicken products	9	9	10	0.08
Predation/impact of predator	16	20	25	0.18
Lack of capital and credit	17	28	18	0.17
Lack of demand during fasting period	41	11	26	0.24
Seasonal disease outbreak	19	30	17	0.19
Drought	0	0	0	0.00
Lack of credit and capital	4	5	5	0.04
Labor	6	3	12	0.05
Lack of veterinary service	8	6	7	0.06

Index = sum of [ 3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular constraints divided by sum of [ 3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all constraints.

### Common chicken diseases

The current study revealed that, the most common chicken diseases in the study area were New castle diseases, Avian influenza and Fowl pox, which are ranked first, second and third with an index of 0.24, 0.18 and 0.17. According to the information obtained during group discussion during the study period, mortality of village bird due to diseases outbreak was usually higher during the start of rainy season, especially April and May. Similar to the current results, New castle disease was the major infectious diseases affecting productivity and survival of village chicken in northwestern Amhara [15]. New castle diseases was the major infectious diseases affecting productivity and survival of village chicken in the central highland of Ethiopia [21].

Table 11: Common diseases of chicken in the study area

Chicken diseases	District (Meket)			
	Rank			
Common name	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	Index
New castle diseases	28	35	17	0.24
Avian influenza	22	16	26	0.18
fowl pox	21	21	24	0.17
Air sac disease	3	16	20	0.08
Mushy chick	16	10	6	0.10
Fowl cholera	19	8	5	0.11
Botulism	6	6	14	0.06
Bumble foot	5	8	8	0.05

Index= sum of (3 for rank1 + 2 for rank 2 + 1 for rank 3) give for each disease divided by sum of ( 3 for rank1 + 2 for rank 2 + 1 for rank 3) for all disease.

### Risk Aversion Strategies

The result of this study indicates that, 79.7% of chicken owners reared birds mainly during dry season, when the risk of disease outbreak and predation is low. Only 20.3% of village chicken owners reared birds throughout the year. It is identified that 97.2% of those chicken owners who reared chicken throughout the year used various risk aversion strategies throughout the year. Accordingly, reduction of flock size and keeping only some productive birds (74.6%)

was the most preferred strategies implemented by chicken owners. Similar to the current finding, Fisseha et al., (2014) reported that 69.3% of chicken owners in north western Amhara region reared birds mainly during dry season, when the risk of disease outbreak and predation is low and reduction of flock size and keeping only some productive birds (84.6%) was the most preferred strategies implemented by chicken owners.

## V. CONCLUSION AND FUTURE SCOPE

Poultry production is one of income generation system and widely practiced by farmers in study area. It is practiced by every farmers as side line with other farming activities and offer farmers with further income. It also used as starting point for young to establish business idea. The result the current indicated that local chicken ecotype were dominant for the existing production system. As observed in this study chicken production in study area was hindered due to poor management like health care, feed shortage, lack of improved breed and predators. This shows there is a need to intervene to reduce chicken mortality and improve productivity. So, this problem can be overcome by slight advance in poultry house, cross breeding with exotic breeds and vaccination of chicken. Therefore, information should be disseminate to farmers about chicken husbandry and government should provide vaccine and improved breeds of chicken for farmers.

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## Authors Profile

*Mr. T.D. Assefa* pursued Bachelor of Science from University of Gonder, in 2016 and Master of Science from Mizan Tepi University in year 2018. He is currently Lecturer at Oda Bultum University in Department of Animal science Sciences. He is a member of Ethiopian Society of Animal Production (ESAP) since 2019, a life member of the ISROSET since 2020. He has published 1 research papers in reputed journal (American Journal of Bioscience and bioengineering) and it is available online. He has 1 year and 7 month of teaching experience.



*Mr. M.A. Ewunetu* pursued Bachelor of Science and Master of Science from Haramaya University, in 1987 and 2005 respectively. Now he is lecturer at University of Gondar. He has more than 25 years teaching Experience. He also promoted Assistant professor of Animal Production since, 28, February, 2013. He has published more than 19 research papers in reputed journal and it is available online. He has 32 years' work experience.

