



# Chicken Production and Marketing Systems in Enkulal Watershed, Dera District, Amhara Region, Ethiopia

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## ABSTRACT

A survey was conducted at Enkulal watershed, which is found in Dera District, Amhara Region, Ethiopia. The watershed was one of the sites of Tana Beles watershed development project. The main objective of the study was to characterize the existing chicken production and marketing system of the watershed. A total 52 randomly selected chicken owners were used for the study. According to the results, there were three chicken production systems in the study areas, scavenging only (3.8%), scavenging with seasonal feed supplementation (65.4%) and scavenging with regular feed supplementation (30.8%). The dominant (95.8%) chicken breeds were local ecotypes. The average chicken flock size per household was 5.8. The first, second and third purposes of chicken were; selling for cash income (48.1%), egg hatching (26.9%), home consumption (69.2%), respectively. Similarly; the first, second and third purposes of eggs were; hatching (48.1%), selling for cash income (55.8%), home consumption (71.2%), respectively. The result indicated that only 11.5% of respondents prepared separate chicken houses for birds and the rest (88.5%) kept birds in various night sheltering places like; inside their house (82.7%), under basket (3.8%) and under local sitting place (1.9%). The average age of cockerels at first mating and pullets at first egg were 26.3 weeks and 28.5 weeks, respectively. The survey revealed that 96.2% of chicken owners experienced disease problems in their area, mainly Newcastle disease (100%). The average number of eggs laid/clutch was 14.3 and the number of total clutch periods/hen/year was 3.73. Accordingly; the annual egg productivity of hens, under the existing management condition was 53.4 eggs/hen. The average hatchability performance of hens was 82.5%. However, survivability was low (61.5%). Seasonal diseases outbreak was the major (86.9%) cause for mortality in the watershed. Seasonality of prices was the major (85.6%) chicken and egg marketing constraint in the areas.

**Key words:** Village Chicken, Production Systems, Local Chicken, Scavenging

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## INTRODUCTION

Poultry production in tropical countries is based on the traditional scavenging system and chickens are the most important poultry species (Tadelle et al., 2003; Gueye, 2000 and Sonaiya et al., 1998). In Ethiopia chickens are the most widespread and almost every rural family owns birds, which provide a valuable source of food and income (Tadelle et al., 2003). The total chicken population in the country is estimated to be 52.3 million with native chicken representing 48.8 million (96.9%), 0.27 million (0.54%) hybrid chicken and 1.29 million (2.56%) exotic chicken (CSA, 2012/13). However, the economic contribution of the sector is not still proportional to the huge numbers, attributed to the presence of many productions, reproduction and infra structural constraints (Aberra, 2000 and Halima, 2007).

Similar to the national system; the major proportion of chicken production (98%) in Amhara National Region State (ANRS) is believed to be a traditional sector from which almost the whole annual meat and egg production is produced (ANRS-BoARD, 2006). According to CSA (2012/13); the total chicken population of the region is estimated to be 14.6 million, accounting to 27.9% of the national chicken population.

According to Cumming (1992) minute research and development works have been carried out on village chickens, despite the fact that they are more numerous than commercial chickens in most developing countries. In recent years attention has been given to the characterization of local chicken ecotypes (Halima, 2007). A study carried out in North Western Ethiopia showed that the growth performances of local ecotypes were comparable with exotic chicken breeds under intensive management conditions (Halima, 2007).

It is difficult to design and implement chicken-based development programs that benefit rural people without detail understanding village chicken production and marketing systems (Gueye, 1998). To date there were no any detailed studies conducted in the home area of the above selected local ecotypes, targeted on a comprehensive description of the prevailing village chicken production and marketing systems, identification of production constraints and assessment of appropriate technological interventions that could be used to improve the breeds. Therefore, this study was conducted to characterize the existing chicken production and marketing systems of the study watershed, evaluate

the productive performance of local chicken ecotypes under existing farmers' management condition and assess the prevailing production and marketing constraints and suggest possible research and development interventions.

## MATERIALS AND METHODS

### Description of the study area

The study was conducted at Enkual watershed, which is found in Gelawdiwos Keble, Dera district, South Gonder zone of Amhara region, Northwest Ethiopia. The watershed has a total land area of 618 hactars. The watershed has a total population size of 460 households. The average elevation of the study watershed is 2650 meter above sea level. The total annual rainfall varies from 1000 mm to 2300 mm. The maximum and minimum annual temperature was 13°C and 23°C, respectively.

### Sampling techniques and Data Collection

The primary data was collected by using structured questionnaire and via field visits inside the watershed. A total of 52 randomly selected, using random sample technique, chicken owner respondents were interviewed for the study. Secondary data regarding the general description of district was collected from the regional and district agriculture offices. Some of the secondary data included average temperature, average annual rainfall, soil type, total household size, total chicken producer households, total land area of the watershed, crop types produced.

### Data management and statistical analysis

The qualitative and quantitative data sets were analyzed using SPSS software, version 16 (SPSS 2002). More specifically descriptive statistics like; mean SD and percentage used and presented in form of tabulation. The p-value was 0.05.

## RESULTS AND DISCUSSION

### Household characteristics

The average family size/household in the study districts was 5.52 (ranged 2-12). The average family size identified in the study area was higher than the national average of 5.2 persons (CACC, 2003) and the reported 5.4 for North Western Amhara Region (Halima, 2007). The average land holding per household in the districts was 1.09 hectares (ranged 0-3.25 hectares). The result was lower than the reported 1.28 hectare/household of North Western Amhara by Halima (2007), but similar to the national average of 1.02 hectare (EEA, 2002).

**Table 1.** Household characteristics of village chicken owners in Enkual watershed, Amhara region, Ethiopia (N=52)

Household characteristics	Results	
	Percentage	Mean±SE
Sex of respondents (%)		
Male	73.1	
Female	26.9	
Education status of respondents (%)		
Illiterate	46.2	
Read and write	30.8	
Grade 1-6	17.3	
Grade 7-12	5.7	
Diploma & above	-	
Total family size in the household (Mean±SE)		5.52±2.36
Land holding/household (ha) (Mean±SE)		1.09±0.77

### Chicken Management

**Production system and flock size:** The most dominant (65.4%) chicken production system identified in the watershed was free range with seasonal feed supplementation, comprised of 96.8% local chicken ecotypes. The other chicken production systems identified in the districts were; scavenging only (3.8%) and scavenging with regular feed supplementation (30.8%). Similarly, Halima (2007) reported that the most dominant (99.2%) chicken production system in Northwest Amhara was scavenging type with only seasonal feed supplementation. The average flock size/household was 5.84 birds (Table 2). The result indicated that the average flock size of the area was lower than the results obtained (13.7 birds/household) in other selected districts of Northwest Amhara (Fisseha et al., 2014).

The result was in line with the findings of Gueye (1997), who reported 5-20 birds/HH in most African countries. However, a relatively higher chicken flock size/household (19 birds), with a hen to cock ratio of 4.4:1, was reported by Khalafalla et al. (2001) in Sudan. Similarly, flock size of 16 birds/household was reported in the central highlands of Ethiopia by Tadelles et al. (2003). The result was also lower than the report of Halima (2007) in North Western Amhara, which was 7.4 birds/HH. According to the discussions conducted with village chicken producers, the chicken flock size varied between seasons of the year (rainy season and dry seasons) which is highly related to the availability of feed, prevalence of diseases and encounter of predators.

**Table 2.** Average number of chicken per each household in Enkual watershed, Amhara region, Ethiopia (N=52)

Chicken type by age and breed	Number of chicken
	Mean±SD
Cross breed young chicken	0.31±1.66
Exotic breed young chicken	0±0
Local breed pullets	0.38±0.953
Cross breed pullets	0.15±0.777
Exotic breed pullets	0.06±0.416
Local breed cockers	0.19±0.991
Cross breed cockers	0.04±0.277
Exotic breed cockers	0±0
Local breed hens	2.50±1.28
Cross breed hens	0.44±1.87
Exotic breed hens	0.15±0.668
Local breed cocks	0.29±0.498
Cross breed cocks	0.04±0.277
Exotic breed cocks	0.06±0.235
Average number of chicken/household	5.84±0.85

The major (35.4%) type of exotic chicken breed produced by smallholder farmers of the study districts were Rhode Island Red (RIR) and their crosses with local chicken. The major (75%) sources of exotic chicken breeds were Regional Bureau of Agriculture and exchanging between farmers. Poor availability of improved chicken breeds (56.3%) was the main reason raised by interviewed farmer for not producing exotic breed at large scale. The majority of interviewed chicken owners (85.7%) preferred to keep large flock only during the dry season, when availability of supplementary feed is better and risk of predators is low.

### Importance of chicken in the study area

According to the result of the field visit, the local chicken ecotypes existed in the study watershed showed phenotypic heterogeneity in terms of plumage color, shank length, growth and comb types. White color was the dominant (53.9%) followed by red color (36.1%). Red was the most preferred (83.6%) color, followed by white (83.5%). Regarding comb types, both single and double comb types were available in the study area, while double comb was the most preferred (78.1%). The selection of color and comb type was mainly attributed to the market preference and presence of cultural attitudes.

According to the results; the purpose of chicken, in order of importance, were; sale for cash income (40.4%), egg hatching and brooding (26.9%) and household consumption (69.2%). Similarly; Tadelles and Ogle (1996) reported that the major purposes of village chicken in central highlands Ethiopia were; selling for income (26.6%), sacrificial purpose/healing ceremonies/ (25%), production (20.3%) and home consumption (19.5%).

Regarding the use of eggs; hatching for replacement was the first (48.1%) function in the study areas. The second and third purposes of eggs were selling for cash income (55.8%) and home consumption (71.2%), respectively. Similarly, Tadelles and Ogle (1996) reported that the major uses of eggs in central Ethiopian highlands were: hatching for replacement (51.8%), selling for cash income (22.6%) and home consumption (20.2%).

### Chicken husbandry practices

**Feed and Feeding:** Though Scavenging Feed Resource Base (SFRB) was the major feed source for village birds in all the study area, 95.7% of interviewed chicken owners provided supplementary feeds, especially during feed shortage seasons. The majority (65.3%) of village chicken owners provided supplementary feed only in wet season while

the rest (30.4%) provided throughout the year. June, July, August and September were the most critical feed shortage months of the year. Both home produced grains and household leftovers were the major kinds of feeds stuffs (55.7%) supplemented by chicken owners. The major (75.7%) source of supplementary feed for village birds in the study area was own crop harvest. The survey result indicated that most of the chicken owners (79.7%) did not have feeders to provide the feed to their birds. Lack of awareness and knowledge was the major reason for the absence of feeders. The result of the study showed that all village chicken owners of the study areas provided water to birds; 85.5% only during the dry season and the rest 14.5% throughout the year. Concerning the frequency of watering, most chicken owners (68.9%) provided water *ad libitum*. Spring water (35.1%), underground water (26.9%), hand operated pipe water (18.4%) and rain water (19.6%) were the main source of water for village birds in the area.

**Housing system:** From the total of 52 village chicken owners interviewed, only 6 households (11.5%) constructed separate overnight houses. However, the majority (88.5%) of village chicken owners did not have over night houses and keep birds on various night sheltering places including; perches inside the house (82.7%), on the floor covered by bamboo made baskets (3.8%) and under locally constructed sitting place (1.9%). Lack of attention to village chicken production (45.6%), lack of construction materials (14%), lack of knowledge and awareness (21.6%), risk of predators (11.1%) and shortage of labor and time (4.4%) were some of the major reasons mentioned by chicken owners for not constructing a separate house for village birds.

**Risk aversion strategies:** The result of this study indicated that 79.3% of chicken owners prefer to rear birds mainly during the dry season, when the risk of disease outbreak and predation is low. It is identified that 95.4% of those chicken owners, who reared birds throughout the year, used various types of risk aversion strategies. Accordingly, reduction of flock size and keeping only some productive birds (94.6%) was the most preferred strategy implemented by chicken owners.

#### Production and reproduction performance of local chicken

The average weight of hens and cocks is presented in table 3. Accordingly; the average weight of hens and cocks were 1.14 kg (ranged 0.6 kg to 2.4 kg) and 1.45 kg (ranged 0.6 kg to 2.9 kg), respectively. The average age of local breed cocks at first mating and local breed pullets at first egg were 26.3 weeks and 28.5 weeks, respectively. Similar studies by various authors also indicated that the age at sexual maturity for local breed hens were; 28 weeks in Tanzania (Katule, 1992), 24 weeks in Mali (Kassambara, 1989), 32 weeks in Sudan (Wilson, 1979), 28-36 weeks in Benin (Assan, 1990) and 25 weeks in Senegal (Sall, 1990). The result indicated that local chicken breeds found around the study area were late maturing.

The productive and reproductive performance of 104 local breed hens was studied and is presented in table 4. Accordingly, the average number of eggs laid/clutch and annual productivity of local hens was 14.3 (ranged 10.5-16.5 eggs) and 53.4 eggs (ranged 31.5-80 eggs), respectively. The average number of eggs/clutch identified in this study was similar with the reported 9-19 eggs in Northwest Ethiopia by Halima (2007), 12-18 eggs in Nigeria by Gueye (1998) and 6-20 eggs in Tanzania by Aichi et al (1998).

**Table 3.** Average weight of local breed hens and local breed cocks found in Enkulal watershed, Amhara region, Ethiopia (N=320 birds)

Parameters	Weight of birds (kg) (Mean±SD)
Average weight of local breed hens (kg)	1.14±0.02
Average weight local breed cocks (kg)	1.45±0.31

**Table 4.** Performance of local breed hens under existing farmers' management condition in Enkulal watershed, Amhara region, Ethiopia (N=104 hens)

Parameters	Result (Mean±SD)
Number of eggs laid/clutch	14.254±1.6467
Number of eggs set for incubation	13.952±2.9210
Number of eggs hatched	11.379±2.2597
Number of chicken survived	6.975±1.9461
Survivability Percentage (%)	61.3±2.7210
Hhatchability percentage (%)	81.6±5.6321
Number of clutches/year/hen	3.73±0.564

### Household labor division for chicken production

The result revealed that all family members of each household participated in chicken husbandry and marketing practices. Men were responsible for few activities like chicken house construction (94.7%) and taking sick birds for treatment (87.3%). However, women were highly responsible for various activities like cleaning birds' house (48.6%), feeding birds (91.7%), selling birds (56.6%) and selling eggs (64.3%). Children also participated in various husbandry activities like cleaning of birds' house, provision of feed and water to chicken.

### Constraints of chicken production

**Disease prevalence:** High incidence of diseases, mainly Newcastle Disease (ND), was the major (86.9%) constraint for the existing village chicken production system of the study watershed. The result revealed that mortality of birds due to ND disease was usually higher during the beginning of the rainy season, mainly on April (69.8%) and May (34.4%). Serkalem et al. (2005) also reported that ND was one of the major infectious diseases affecting productivity of chickens in central high lands of Ethiopia. Access of vaccines and veterinary drugs to chicken producers was generally poor in all study area. It is also discovered that the available vaccines and drugs were relatively expensive and sold in large quantity batches (for example, in 350 doses for ND vaccines) that they were uneconomic for farmers, who generally keeps a small flock of birds. According to our discussion made with the farmers control of chicken diseases in area could be achieved through improvement in veterinary and advisory services.

**Predation:** Predation was the second major (85.3%) constraint for village chicken production system of the study area. According to interviewed chicken owners, wild birds were the major (54.3%) predators affecting village chicken in the study areas. The problem of predators dictated that preparation of predator-proof chicken houses could help to reduce losses, especially during night time.

**Poor chicken management practices:** According to our field visit, awareness of farmers about modern chicken husbandry practices was too low. This revealed that village chicken producers should get successive trainings to improve their awareness and knowledge towards modern chicken husbandry practices.

**Lack of productive breeds:** The result of the survey revealed that the productive performance of local chicken breeds in the study areas was relatively low when compared to improved breeds. However, they were highly adapted to the adverse climatic and management conditions of the study areas. Most chicken owners like to rear improved breeds, so as to upgrade the blood levels of their local birds and improve their productivity.

### Marketing systems

**Characteristics of markets:** The survey revealed that most (98.9%) of interviewed farmers involved in chicken and eggs marketing activities. Similar to most parts of the country, there was no any formal chicken and egg marketing operation in the study area. Village chicken producers, consumers and Middlemen were identified to be the major actors involved in the system. Marketing of chicken and eggs in the study districts takes place in various places including: farm gates (9.7%), local markets (41.3%) and urban market (49%). Product type (sex, age, color, comb type), season (dry and wet), market type (urban and rural markets), market day types (holyday market and ordinary market days) and fasting seasons were some of the major factors that determined the price, supply and demand of chicken products in the study area.

**Marketing constraints:** The result of the current study indicated that religious holydays were highly associated with consumption chicken meat and eggs. Orthodox Christian fasting periods were highly related with decreased consumption /demand/ of chicken meat and egg. Seasonality in prices of chicken products was the major (85.6%) chicken and egg marketing constraint of the study areas. Other marketing constraints identified in the areas included: low supply of chicken products, lack of market outlets, lack of appropriate marketing information, lack of demand during fasting periods, lack of chicken transportation and egg handling facilities, lack of credits and capital to expand chicken production and marketing activities.

**Agricultural extension and credit services:** The result of the survey indicated that only 48.2% of interviewed farmers are getting agricultural extension service in relation to modern chicken husbandry practices like; proper feeding, housing and health cares. According to the response of interviewed farmers there wasn't any credit service for chicken production activity in the study area.

## CONCLUSION

The result of the present study indicated that scavenging with seasonal feed supplementation was the dominant chicken production system type existed at Enkual watershed, Amhara Region. Local chicken ecotypes were dominant for

the existing production system. Seasonal disease outbreak was the major village chicken production constraint of the study area followed by predation, which showed there is a need to intervene in order to reduce chicken mortality and improve productivity.

### **Recommendation**

The study result indicated that control of diseases, mainly ND, was found to be very critical in the study area. It could be achieved through improvement in veterinary and advisory services.

Provision of proper trainings to chicken producers on modern husbandry practices could be important to improve the awareness of village chicken producers.

Provision of appropriate marketing information to village chicken producers could be important for the improvement of chicken and egg marketing system of the study area.

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