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Marketing and Price Determinant Factors of Village Chicken Products: The Case of Western Zone of Tigray

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Abstract

The survey was aimed at assessing village chicken marketing, price determinant factors and stakeholders involved in the supply chain of live chickens and eggs in western zone of Tigray. Multi stage sampling produres were employed to select weredas, sample kebeles and respondents in which three rural weredas were selected by purposive sampling technique; stratified purposive techniques were employed to select nine sample kebeles and purposive random sampling techniques were used to select a total of 385 respondents. Pretested structured questionnaire and focused group discussion were employed to generate data. Market outlets and marketing constraints were analyzed using descriptive statistics of SPSS 16. Kruskal- Wall's test option of Non-parametric tests of SPSS 16 was employed to test proportion difference of each variable among the altitudes. Ranking index was employed to rank identified price determinant factors. Plumage color (1st), body weight (2nd), comb type (3rd) and shank color (4th) were the predominant factors that cause variability in the price of live chickens. Marketing of chicken products mainly constrained by poor infrastructure and lack of information. Producers, village collectors, retailers and consumers are stakeholders involved in the supply chain of live chickens whereas there is less involvement of wholesalers in the supply chain of eggs in addition to aforementioned actors. Overall, the participation of wholesalers in the supply chain of indigenous chicken products is almost none which in turn indicates the volume of transaction in the study area were small. Moreover, the demand of local chicken products increases with time but the supply of chicken product is still below the requirement because constraints related to marketing and productions make chicken productivity very low. There is a need to address the various constraints affecting the supply chain of indigenous chicken products through designing and implementing of environmentally friendly sustainable and holistic productivity improvement strategies in order to ensure sustainable improved chicken productivity and satisfy the needs of actors there by to improve food security of small scale farmers. Sustainability of holistic improvement strategy of chickens achieve only if preference of all actors involved in the supply chain of chicken products and price determinant factors are incorporated in designing of the strategies. Further research on econometric analysis of the identified price determinant factors and value chain analysis of indigenous chicken products is required to identify roles of actors involved in the value chain.

Key words: Supply chain, Role of Stakeholders,   Price determinant factors

1. Introduction

Keeping Poultry particularly domestic chickens is the backbone economy base of poor resource households in developing countries like Ethiopia and the world as a whole. Globally, village chicken production is recognized as strategy for capital build up, food security attainment, and malnutrition, poverty and hunger reduction among small scale households owing to their short reproduction cycles and low input requirement for production (Besbes 2009). They also have social, cultural and religious importance, and improve growth, mental development, school performances and labor productivity and reduce the likelihood of illness among the small-scale farmers' children through diversification of consumable foods (Martin *et al*. 2011). On top of these merits, poultry serve as a scaling-up enterprise to larger livestock species (Dolberg 2003) and considered as the entry point for poverty reduction'' and gateway to national food security (Gueye 2009).

Ethiopia has an estimated of 49.3million with indigenous chicken of non-descriptive breeds accounting 97.3%, hybrid chicken 2.32% and exotic breeds 0.38% (CSA 2011).Moreover, 97.3% of indigenous chickens has been distributed in different agro-ecological zones of Ethiopia (CSA 2011) and their distribution indicate their adaptive potential to different environmental conditions, diseases and other stresses (Halima 2007).Village chicken fulfills many roles in the livelihood of resources poor households of Ethiopia such as food security, income generation and others. Consumers usually prefer products of local chicken to exotic ones because of flavor and taste of the products (egg and meat) (Amsalu 2003). Despite their significant roles, their low

performances masked their potential to uplift the living standards of their owners and contribute to rural developments in Ethiopia. This has been attributed to their low genetic potential, prevalence of diseases and predators, limited feed resources, constraints related to institutional and socio-economic and limited skill management practices (Solomon *et al*. 2013; Nebiyu *et al*. 2013; Nigussie *et al*. 2010).

In Ethiopia, the growth of village chicken production is constrained by poor infrastructure, lack of information and poor marketing system (Halima 2007; Bogale 2008; Meseret 2010).Information on market actors, price determinant factors, marketing outlets , preferences of all supply chain actors ,marketing opportunities and constraints have played key role in identification of key points of interventions along the supply chain, and are essential for development of agro-ecologically based and holistic improvement programs in order to ensure sustainable improvement, utilization and conservation of chicken genetic resources. Little or no researches have done on marketing and factors associated with marketing of chicken products in Tigray region in general and in western zone in particular. Thus, this study was proposed to investigate chicken product marketing constraints, supply chain actors and price determinant factors of chicken products in western Tigray with the expectation of its role in narrowing the information gap on this area of interest.

2. Materials and Methods

2.1. Description of Study Area

The study was conducted in the three rural weredas (Kafta Humera, Welkait and Tsegede) of Western Zone of Tigray Regional State, North West Ethiopia. It is one of the five administrative zones of Tigray regional state and it has four (4) districts (Setit Humera, Kafta Humera, Welkait and Tsegede) comprising of 81 kebeles with 77 rural kebeles (24, 25 and 28 kebeles from Kafta Humera, Tsegede and Welkait weredas, respectively) and 4 urban kebeles with distance range of 580–750 km from Mekelle, the capital city of Tigray. Setit Humera was not included in the study because it is represented by Kafta Humera. It covers an area of 1.5 million hectare with Kafta Humera accounts 48.13%, Setit Humera accounts 0.82%, Tsegede accounts 23.43% and Welkait accounts 27.62% (HARC 2013). The total cultivated land of the zone is 573,285 hectares (38.2%) while the uncultivated land accounts 927,000 hectares (62.8%). 341,195.25 hectares (36.8%) of the uncultivated land is covered by different plant species excluding Bowsellia and Acacia Senegal While 185,510 hectares (20%) of the unfarmed land is solely covered by both Bowsellia and Acacia Senegal. The zone consists of three agro-ecological zones (lowland, midland & highland).75%, 15.7% and 9.3% of the land coverage of the zone is Kolla(lowland), weynadegga (midland) and dega (highland), respectively. The geographical location of the zone is 13°42′ to 14°28′ north latitude and 36°23′ to 37°31′ east longitude (Mekonnen *et al*. 2011).The annual rainfall of the zone ranges from 600 mm to 1800 mm while the annual temperature ranges from 27^0c to 45 ^{0}c in the lowland areas (Kolla) and 10^0c to 22 ^{0}c in both midland and highland areas of the zone. The altitude of the zone ranges from 500- 3008 m.a.s.l. The zone shares borders with Tahtay Adibayo, Tselemti and Asgede Tsimbla in the East, Sudan in West, Amhara region in South and Eritrea in the North. The study area represents a remote, tropical climate where extensive agriculture is performed manually by large numbers of migrant laborers.

Throughout the zone, livestock agriculture is the predominant economic activity with about 95% of the total population engaged directly or indirectly in it (Mekonnen *et al*. 2011).Main cattle breeds raised in the Western Zone are the local Arado (in both high land and mid land areas) and Begait cattle (in lowland areas). Semi-intensive production is practiced in Humera district, which is more urban, while extensive production system is dominant in the Welkait and Tsegede districts. The main crops cultivated in the lowland areas of the zone are sesame, cotton and sorghum while teff, wheat, barley, noug, lentils, finger millet, field peas and fababeans are cultivated crops in both midland and high land areas of the zone.

2.2. Sampling Techniques

Three rural (welkait, Tsegede & Kafta Humera) weredas were purposely selected. All kebeles (smallest administrative units in Ethiopia) of three weredas were stratified in to three agro-ecological zones namely lowland, midland and highland (kebeles of both welkait and Tsegede weredas were stratified in to lowland, midland and highland but kebeles of Kafta Humera were stratified in to lowland and midland agro-ecological zones as it only comprises midland and lowland areas). Based on the village poultry population density, chicken production potential and road accessissibilty, four, three and two kebeles were purposely selected from lowland, midland and highland agro-ecological zones, respectively. A total of 385 farmers who keep a minimum of three and above local chickens were selected from household package beneficiary's registration book of each selected kebele using purposive random sampling technique. The number of respondents per each sample kebeles was determined by proportionate sampling technique based on the households' size of the sample kebeles.

2.3. Sample Size Determination

Required total respondents were determined using the formula by Cochran (1963) for infinite population (infinite population ≥ 50,000)**.**

$N_o = [Z^2 pq] / e^2$ **,** Where N_o = required sample size

Z^2 =is the abscissa of the normal curve that cuts off an area at the tails (1-α)

(95%=1.96)

e = is the margin of error (eg. ±0.05% margin of error for confidence level of 95%)

p = is the degree of variability in the attributes being measured refers to the distribution of attributes in the population

q= 1-p.

$N_o = [Z^2 pq] / e^2$ == [(1.96)^2 x (0.5) (0.5)]/ (0.05x0.05)

= [3.8416 x0.25]/ (0.0025)=0.9604/0.0025=**385** farmers

The numbers of respondents (farmers) per single selected kebele were determined by proportionate sampling technique as follows:

W= [A/B] x N_o, where **A**=Total number of households (farmers) living per a single selected kebele, **B**= Total sum of households living in all selected sample kebeles and **N_o** = the total required calculated sample size

2.4. Data Collection

Data on chicken products' marketing practices, poultry product constraints and price determinant factors of live local chickens were collected through individual interview using pretested well structure questionnaire and this was augmented with one focused group discussion per each agro-ecology with 10-12 discussants per each group.

2.5. Statistical Analysis

The chicken products' practices and constraints were analyzed using descriptive statistics of frequency procedures and cross-tabulation of SPSS version 16 (2007). The Kruskal-Wallis Test option of the non-parametric tests of SPSS was employed to test the effects of the agro-ecology on the proportion of each marketing practices and constraints.

2.5.1. Ranking of Price Determinant Factors of Chicken Products

Identified price determinant factors of chicken products during the individual interviews were prepared into separate flip charts and presented to each group for rating them according to their order of importance. The rank of price determinant factors of chicken products from individual respondent obtained through direct interview in the survey was analyzed using Ranking index**:**

Index =Σ (n x number of HHs ranked first) + (n-1) x number of HHs ranked second + (n-2) x number of HHs ranked third +…+ 1xnumber of HHs ranked last) for one factor divided by the Σ (nxnumber of HHs ranked first+ (n-1) x number of HHs ranked second+…. +1x number of HHs ranked last) for all factors(Kosegey 2004) and where n=number of factors under consideration. The variable with the highest index value is the highest economically important.

3. Result and Discussion

3.1. Marketing System of Chickens and Eggs

Indigenous chickens are mainly kept for egg and meat production in the study area. Local chicken owners usually use the produced eggs either for breeding (hatching), selling and home consumption. Overall, the result revealed that 99.7% of the respondents had participated in selling of chicken products while the rest 0.3% of them didn't practice selling (Table 1). Depending up on the location of farm dwelling, farmers usually sell most of their chicken products in either of the same village (64.2%), woreda market (3.3%) and both same village and woreda market (32.2%).

There were significant variations with respect to the proportions of respondents who practiced selling of chicken products in different market sites among the agro-ecologies of the study area (p<0.05). Higher proportions of households sold chicken products to their neighbors in the same village (98.8%) in lowland than in midland (67.9%). None of the respondents had practiced selling of chicken products in sole same village of the highland agro-ecology. However, greatest proportions of respondents sold their chicken products in either of wereda market (9.6%) or both same village and wereda market (90.4%) in highland as compared to both midland (3.1% and 28.2%) and lowland (3.3% and 1.2%, respectively). Similarly, Bogale (2008) also reported that 41.7% and 33.3% of the respondents sold their chicken products in the nearest market and woreda market   during market days, respectively while 19.4% sold their products within their respective kebeles during non-market days. In her study in Gomma wereda of Jimma zone, Meseret (2010) also reported that chicken products were sold either at the farm gate, primary market (small village market) or at secondary market (at large wereda town). She also pinpointed that informal marketing of chicken products in an open market was a common practice in Gomma

wereda.

The result of the study also indicated that there were significant variations with reference to the location of market sites in either of the same village or wereda market from the homesteads of the respondents across the agro-ecological zones of the study area. Overall, 96.4% of the respondents sold their chicken products in the market site of same villages through traveling a distance of either less than one kilometer (5.2%), 1-5km(34.5%), 5-8km(23.1%), 8-10km(22.6%) or greater than ten kilometers (10.9%) whereas the remaining 3.3% and 0.3% of them did not sell there and sell at all, respectively .

In the same way,35.6% of the respondents sold their chicken products in th market site of wereda town(capital) by traveling a distance of either less than one kilometer(0.3%),1-5km(2.9%),5-8km(2.6%).8-10km(4.9%) and greater than ten kilometers (24.9%) while the remaining 64.1% and 0.3% of them didn't sell chicken products in the wereda market and didn't sell their products at all respectively. It was also observed that marketing of chicken products (live chickens and eggs) have been carried out throughout the week with one regular market day at the center of each kebele in lowland and rarely practiced in midland agro-ecology. However, exchanges of chicken products have been taken place with one regular market day per a week in the high agro-ecology of the study area. Furthermore, farmers are highly interested to sell their chicken products in the wereda market rather than selling in the market of the same village because chicken products are sold with relatively higher prices in the wereda market than in the same village.

Pertaining to regular client (buyer) of chicken products, the result also showed that there were significant variations with regard to the proportions of regular clients and types of market flow of chicken practiced among the agro-ecological zones of the study area (Table 1). Generally ,78.4% of the respondents sold their chicken products directly to consumers (65.2%) followed by both collectors in market and sell to consumers (19.5%) and both village collectors and sell to consumers (1.8%) following both directly and indirectly market flow channel (34.5%) in the study area. This result is somewhat comparable with the reports of Meseret (2010) that live chickens and eggs have passed through several individuals before reaching to consumers in Gomma wereda of Jimma zone and she also outlined that market collectors and consumers were the major clients of chicken products in Gomma wereda. However, contrasting results have been reported from North Wollo zone that 92.16% and 7.84% of the respondents sold live chickens indirectly and directly to consumers, respectively (Addisu *et al*. 2013).

The result of the survey indicated that the distribution of marketing problem types didn't differ among the agro-ecological zones of the study area (Table 1). The respondents replied that poor infrastructure and lack of information (28.8%),poor infrastructure(22.4%), lack of market place and infrastructure (15.6%), lack of information (12.5%),lack of market place(10.4%), poor sales(demand seasonality)(2.3%), domination of market by other traders(0.8%), unstable chicken prices (0.3%) and poor sales and lack of information (0.3%) were the main marketing problems while the remaining 6.2 % of the respondents didn't face any chicken marketing problems at all in the study area. In a study conducted in North Wollo zone of Amhara Regional State revealed that instable chicken price (40.85%), demand seasonality (29.41%) and lack of market place (29.74%) were found to be the most important constraints of marketing chicken products(Addisu *et al*. 2013). Similarly, Meseret (2010) also reported that demand seasonality (42.3% and 41.7%), unstable prices (19.4% and 24.4%) and unstable price and demand seasonality (38.3% and 33.9%) were the problems of live chickens and eggs marketing, respectively, in Gomma wereda of Jimma zone.

The result of the survey indicated that all respondents (100%) replied that the price of live chickens vary based on different determinant factors. According to the result of both respondents 'interview ranking indices and ranking by focused group discussion confirmed that plumage color (1st), body weight (2nd), comb type (3rd), shank color(4th), smoothness of legs(shank)(5th),sex(6th), spur presence(7th), length of legs(8th), head shape(9th) and market site(10th) were the major factors that cause variation in the price of live chickens in the study area(Table 2). The pooled result of the survey and focused group discussions indicated that price determinant factors were ranked similarly in both lowland and midland agro-ecologies like plumage color (1st), body weight (2nd), comb type (3rd), shank color (4th), smoothness of legs (shank) (5th), sex (6th), spur presence (7th), length of legs (8th), head shape (9th) and market site (10th) (Table 2). However, ranking of factors in highland agro-ecology was slightly different from both agro-ecologies in which rank positions of both body weight and comb type were reversed (Table 2). Similarly, Bogale (2008) reported that plumage color, comb type, plumage color and comb type, body weight, age, sex and seasons were relevant factors that brought variations on the price of live chickens at market level in Fogera district.

Besides, Addisu *et al* (2013) also reported that the prices of live chickens were determined based on body weight (41.83%), combination of comb type and plumage color (32.35%) and plumage color (25.82%) in buying and selling marketing system in North Wollo zone of Ethiopia. In the same way, Halima (2007) also reported that seasonal demand (holidays and fasting seasons), lack of infrastructure, plumage color, size, age, sex, market sites and health status of the chickens had great effect on live chicken prices in North West Ethiopia. The price of poultry and poultry products were strongly affected by season in the Centeral highlands of Ethiopia (Tadelle &

Ogale 2000). This result somewhat corroborates the findings of Hunduma *et al* (2010) in which demand and supply of chicken products which notably related to religious festivals (mainly Christian festivals), market day types (holiday versus ordinary market days) together with plumage color (45.4%), physical stand and shank length (37.1%), comb type (8.6%) and parents' performance (pedigree) (1.1%) were the major price determinant factors of chickens and chicken products in Rift Valley of Oromia. Melkamu and Wube (2013) also reported that annual festivity time and coat/plumage color were the two pronounced factors in determination of chicken products' prices in Debsan Tikara kebele at Gondar Zuria woreda, North Gondar, Ethiopia. In Uganda, breed type (local chicken highly preferred to exotic breeds because of their tasty (56.7%) products) and annual social and religious festivity were the critical price determinant factors of chicken products in Kampala city (Emuron *et al.* 2010). In a similar context, Mengesha *et al* (2008) also reported that body weight (34.2%), plumage color (33.3%) and comb type (32.4%) were the most predominant criterias commonly used for judging the prices of local chickens, and purchasing power of consumers' (33.4%), fasting (33.2%) and availability of products (32.5%) were the major remarkable causes of the price fluctuations of village chicken and chicken products in Jamma district of South Wollo zone of Ethiopia. Samson and Endalew (2010) also reported that seasonal supply and demand (especially Orthodox Christain holiday vs fasting seasons) and market day types (Ordinary days vs Market days) and plumage colors (brown, gray and red (72%), black (18%) and white (10%) in their order of preference) were the predominant factors that caused price variability of chicken and chicken products in Mid Rift Valley of Oromia. In Jordan, the chickens' phenotype, sex and age, and by season of the year were the major prices determining factors of chickens in the area (Abdelqader *et al.* 2007).

3.2. Supply Chain of Local Chicken Products in Western Zone of Tigray
A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw material, and components into a finished product that is delivered to the end customer http://en.wikipedia.org/wiki/Supply_chain.

3.2.1. Actors in Local Chicken Product Supply Channels and Supply Sources
Live chicken and eggs are the marketable products of chickens in the study area. The stakeholders or actors involved in the supply chains of live chickens and eggs and their sources are presented in Table 3 showed variability across agro-ecological zones. A farmer (producer) to end consumers is the sole marketing channel of both live chickens and eggs in the lowland whereas three marketing channels of live chickens and four marketing channels of eggs are practiced in both midland and highland agro-ecologies(Figure 1 and 2). On the other hand, midland and highland chickens are the sole sources of marketable live chicken and eggs in midland and highland agro-ecology respectively while chickens from lowland, midland, highland and North Gondar zone are the sources of marketable live chickens and eggs in the lowland agro-ecology. This is due to the demand of chicken products in the lowland agro-ecology is significantly higher than other areas. Since the study area shares borders with Sudan in West and Eritrea in the North which increase the marketing opportunity for village chicken producers to sell their chicken products with better price. Moreover, the lowland agro-ecology is the center of investment zone and in particular Kafta Humera is the center of Sesame investment zone. Due to this fact, different investors from different corners of Ethiopia as well as from Sudan, Eritrea, Nigeria and Senegal are engaging in different investment areas of the study area. Wholesalers only participate in the supply chain of purchased eggs from North Gondar but they do not completely participate in the supply chain of live chickens, and eggs purchased from the other sources. This indicates the volume of transaction in the study area were small. Moreover, the demand of local chicken products increases with time but the supply of chicken product is still below the requirement because constraints related to marketing and productions make chicken productivity very low. There is a need to address the various constraints affecting the supply chain of indigenous chicken products through designing and implementing of environmentally friendly holistic productivity improvement strategies in order to ensure sustainable improved chicken productivity and satisfy the needs of actors there by to improve food security of small scale farmers.

4. Conclusion
Poor infrastructure and lack of information are outlined as the major chicken marketing problems that directly affect the supply chain of chicken and eggs in the study area. Plumage (1st), body weight (2nd), comb type (3rd) and shank color (4th) are the major determinant factors that cause variability in the price of live chicken. Actors' involvements in the supply chain of chicken products vary across agro-ecologies. Producers, village collectors, retailers and consumers are stakeholders involved in the supply chain of live chickens whereas there is less involvement of wholesalers in the supply chain of eggs in addition to aforementioned actors. Overall, the participation of wholesalers in the supply chain of indigenous chicken products is almost none. This indicates the volume of transaction in the study area were small. Moreover, the demand of local chicken products increases

with time but the supply of chicken product is still below the requirement because constraints related to marketing and productions make chicken productivity very low. There is a need to address the various constraints affecting the supply chain of indigenous chicken products through designing and implementing of environmentally friendly sustainable and holistic productivity improvement strategies in order to ensure sustainable improved chicken productivity and satisfy the needs of stakeholders there by to improve food security of small scale farmers. Sustainability of holistic improvement strategy of chickens achieve only if preference of all actors involved in the supply chain of chicken products and price determinant factors are incorporated in designing of strategies. Further researches on econometric analysis of the identified price determinant factors and value chain analysis of indigenous chicken products are required to identify roles of actors involved in the value chain.

Acknowledgements

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Table 1: Market outlets, distance of market place from homestead and marketing constraints of chicken products in Western zone of Tigray

Variable	Agro- ecological zones				X2-test	p-value
	Highland n (%)	Midland n (%)	Lowland n (%)	Total n (%)		
Where do you sell most of the chicken product?					245.42(*)	0.00
In the same village	-	89(67.9)	158(98.8)	247(64.2)		
In woreda market	9(9.6)	4(3.1)	-	13(3.3)		
In the same village & woreda market	85(90.4)	37(28.2)	2(1.2)	124(32.2)		
Not selling at all	-	1(0.8)	-	1(0.3)		
Distance of the market place in the same village from homestead					52.945(*)	0.00
<1km	1(1.1)	4(3.1)	15(9.4)	20(5.2)		
1-5km	32(34)	18(13.7)	83(51.9)	133(34.5)		
5-8km	29(30.9)	33(25.2)	27(16.9)	89(23.1)		
8-10km	17(18.1)	49(37.4)	21(13.1)	87(22.6)		
>10km	6(6.4)	22(16.8)	14(8.8)	42(10.9)		
I don't sell there	9(9.6)	4(3.1)	-	13(3.3).		
Not selling at all	-	1(0.8)	-	1(0.3)		
Distance of the market place in the woreda from homestead					9.623(*)	0.008
<1km	1(1.1)	-	-	1(0.3)		
1-5km	11(11.7)	-	-	11(2.9)		
5-8km	10(10.6)	-	-	10(2.6)		
8-10km	13(13.8)	6(4.6)	-	19(4.9)		
>10km	59(62.8)	35(26.7)	2(1.2)	96(24.9)		
I don't sell there	-	89(67.9)	158(98.8)	247(64.1)		
Not selling at all	-	1(0.8)	-	1(0.3)		
Your regular client of chicken product					74.922(*)	0.00
Sell to consumers	57(60.6)	85(64.9)	160(100)	302(78.4)		
Collectors in market & sell to consumers	37(39.4)	38(29)	-	75(19.5)		
Village collectors & sell to consumers	-	7(5.3)	-	7(1.8)		
Not selling at all	-	1(0.8)	-	1(0.3)		
Chicken marketing problems					3.683(ns)	0.159
Unstable chicken prices	-	-	1(0.6)	1(0.3)		
Poor sales (demand seasonality),lower price in fasting & higher price non-fasting time)	-	-	9(5.6)	9(2.3)		
Lack of market place	-	-	40(25)	40(10.4)		
Poor infrastructure (road & market)	30(31.9)	57(43.5)	1(0.6)	88(22.9)		
lack of information	-	26(19.8)	22(13.8)	48(12.5)		
Poor infrastructure & lack of information	53(56.4)	23(17.6)	35(21.9)	111(28.8)		
Lack of market place & information	11(11.7)	24(18.3)	25(15.6)	60(15.6)		
Market dominated by other traders	-	-	3(1.9)	3(0.8)		
Poor sales & lack of market place	-	-	1(0.6)	1(0.3)		
I don't have any problem	-	1(0.8)	23(14.4)	24(6.2)		
Market flow of live chicken & eggs					198.987(*)	0.00
Directly to consumers	12(12.8)	79(60.3)	160(100)	251(65.2)		
Both directly & indirectly to consumers	82(87.2)	51(38.9)	-	133(34.5)		
Not selling at all	-	1(0.8)	-	1(0.3)		
Is there variation in live chicken prices?					000(ns)	1.00
yes	94(100)	131(100)	160(100)	385(100)		
no	-	-	-	-		

* (p<0.05) and ns (p>0.05) and n=number of respondents interviewed per agro-ecology

Table 2: Ranking of price determinants of live chickens in Western zone of Tigray

Traits	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Index
Lowland agro-ecological zone											
Plumage color	131	28	0	0	1	0	0	0	0	0	0.1787
Body weight	29	57	28	45	0	1	0	0	0	0	0.1535
Comb type	0	73	84	1	0	0	0	2	0	0	0.1529
Shank color	0	0	47	105	2	0	0	0	0	6	0.1286
Smoothness of legs (shank)	0	0	1	0	104	46	2	7	0	0	0.1015
sex	0	1	0	3	50	76	1	29	0	0	0.0913
Spur presence	0	0	0	6	2	29	122	1	0	0	0.0786
Length of legs	0	1	0	0	1	8	29	121	0	0	0.0608
Head shape	0	0	0	0	0	0	0	0	160	0	0.0365
Market site	0	0	0	0	0	0	6	0	0	154	0.0175
Midland agro-ecological zone											
Plumage color	127	4	0	0	0	0	0	0	0	0	0.1806
Body weight	14	51	50	16	0	0	0	0	0	0	0.1558
Comb type	0	65	62	0	0	0	0	4	0	0	0.1511
Shank color	0	0	19	110	1	0	0	0	0	1	0.1285
Smoothness of legs (shank)	0	0	0	0	110	6	5	0	0	0	0.1051
sex	0	0	0	4	16	60	1	50	0	0	0.0799
Spur presence	0	0	0	1	4	50	75	1	0	0	0.0808
Length of legs	0	1	0	0	0	5	50	75	0	0	0.0635
Head shape	0	0	0	0	0	0	0	0	131	0	0.0362
Market site	0	0	0	0	0	0	1	0	0	130	0.0185
Highland agro-ecological zone											
Plumage color	86	8	0	0	0	0	0	0	0	0	0.1802
Body weight	8	28	48	10	0	0	0	0	0	0	0.1520
Comb type	0	55	39	0	0	0	0	0	0	0	0.1561
Shank color	0	0	7	75	11	0	0	0	0	1	0.1253
Smoothness of legs (shank)	0	0	0	0	75	18	1	0	0	0	0.1052
sex	0	0	0	8	8	27	3	48	0	0	0.0764
Spur presence	0	0	0	1	0	48	42	3	0	0	0.0820
Length of legs	0	3	0	0	0	1	48	42	0	0	0.0677
Head shape	0	0	0	0	0	0	0	0	94	0	0.0364
Market site	0	0	0	0	0	0	1	0	0	93	0.0188
Zone wise ranking of price determinants of live chickens in Western Tigray											
Plumage color	344	40	0	0	1	0	0	0	0	0	0.1796
Body weight	51	16	126	71	0	1	0	0	0	0	0.1531
Comb type	0	13	185	1	0	0	0	6	0	0	0.1530
Shank color	0	0	73	290	14	0	0	0	0	8	0.1277
Smoothness of legs (shank)	0	0	1	0	289	0	8	7	0	0	0.1036
sex	0	1	0	15	74	163	5	127	0	0	0.0837
Spur presence	0	0	0	8	6	127	239	5	0	0	0.0801
Length of legs	0	5	0	0	1	14	127	238	0	0	0.0634
Head shape	0	0	0	0	0	0	0	0	385	0	0.0363
Market site	0	0	0	0	0	0	8	0	0	377	0.0193

R1, R2, and R3…R10=Rank 1, 2, 3…10, respectively; and Index=Σ (10 for Rank1+9 for Rank2+…+1for Rank10) given for an individual factor divided by Σ (10 for Rank 1+ 9 for Rank 2+…+ 1 for Rank 10) for overall factors.

Table 3: Role of stakeholders, supply channels and sources of indigenous chicken products

| Chicken product type	Agro-ecological zones		
	Supply channels		
	Lowland	Midland	Highland
Chicken	Farmer → Consumer	Farmer → Consumer	Farmer → Consumer
		Farmer → Retailer → consumer	Farmer → Retailer → Consumer
		Farmer → Collector → Retailer → Consumer	Farmer → Collector → Retailer → Consumer
Egg	Farmer → Consumer	Farmer → Consumer	Farmer → Consumer
		Farmer → Retailer → Consumer	Farmer → Retailer → Consumer
		Farmer → Collector → Retailer → Consumer	Farmer → Collector → Retailer → Consumer
		Farmer → Wholesalers → Retailer → Consumer	Farmer → Wholes → Retailer → Consumer
	Marketable chicken product supply sources		
Chicken	Lowland chicken	Midland chickens	Highland chickens
	Midland chicken		
	Highland chicken		
	North Gondar zone		
Egg	Lowland chicken egg	Midland chicken egg	Highland chicken egg
	Midland chicken egg		
	Highland chicken egg		
	North Gondar zone		
	Role of stakeholders involved in the supply chains of indigenous chickens		
Actors/stakeholders	Role		
Producers (farmers)	Produce chickens and eggs for hatching, market and home consumption		
Consumers	Purchasing from farmers and traders for consumption		
Traders (village collectors, retailers and whole sellers)	Buying from farmers or other traders and selling to consumers or other traders		
Government organizations	Providing marketing in formations, infrastructures , training, improved chicken breeds and others		
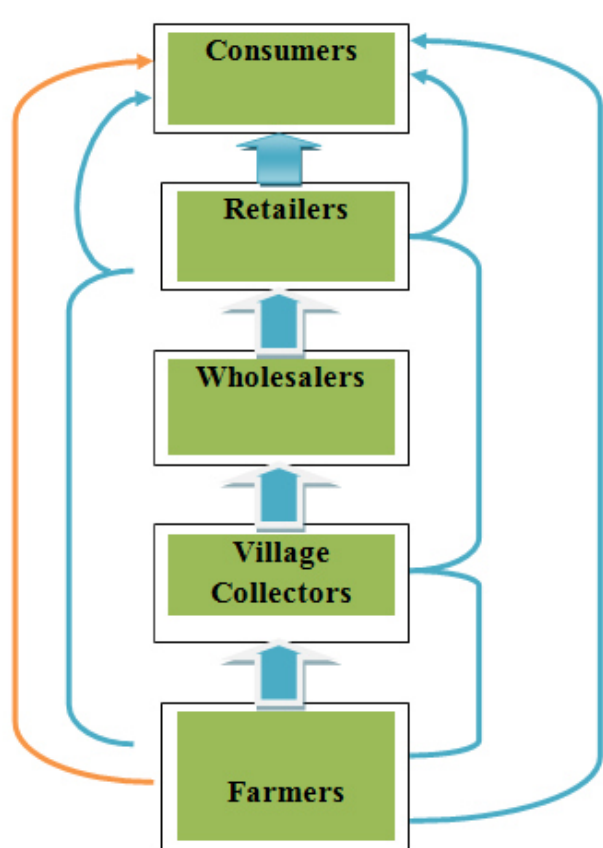
Figure 1. Supply Chain Map for eggs in Western Zone of Tigray

Legend:
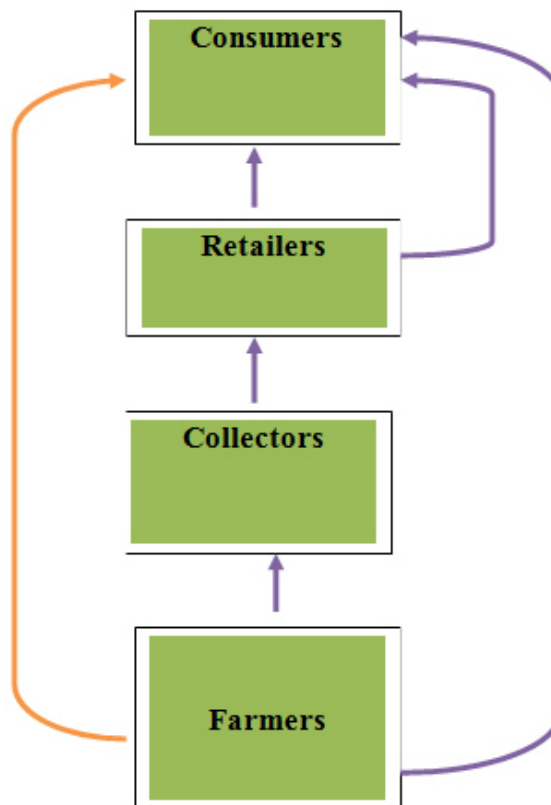— Supply chain of lowland and
— Supply chain in both midland & highland

Figure 2. Supply chain map for live chickens in Western Zone of Tigray

Legend:
— Supply chain of lowland and
— Supply chain of midland & highland

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