

# Evaluation and Key Lessons on Smallholder Farmers' Improved Chicken Supply Chain and Backyard /Local Chicken Performance

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## Table of contents

I.	Executive Summary .....	2
II.	Introduction.....	3
	2.2. Objectives of the Evaluation .....	4
III.	Methodology .....	5
	3.1 Research Design.....	5
	3.2 Sampling Method.....	5
	3.3 Methods of Data Collection .....	6
	3.3.1 Survey .....	6
	3.3.2 Key informant interview .....	6
	3.3.3 Focus group discussions.....	6
	3.3.4 Case studies.....	6
	3.4 Data analysis and interpretation.....	7
IV.	Findings of the Evaluation .....	7
	4.1. Household Characteristics.....	7
	4.2. Improved Chicken Distribution Package .....	8
	4.3 Husbandry and Management .....	9
	4.4 Health and Bio-security .....	11
	4.5 Extension Service and Technical Support .....	12
	4.6 Production and Productivity of the Chicken farming .....	14
	4.7 Consumption and income benefits from the improved chicken farming .....	16
	4.7.1 Nutritional Benefits: Consumption of egg and chicken meat .....	16
	4.7.2 Income.....	17
	4.8 Sustainability of the Improved Chicken Support.....	18
	4.9 Challenges of Improved Poultry Production.....	20
V	Discussion on the Findings .....	23
VI	Conclusion .....	26
VII	Recommendations.....	27
	Suggested Scheme .....	28
VIII.	References.....	28
IX.	Annex (Assessment tools).....	30

## **I. Executive Summary**

Feed the Future Ethiopia Growth through Nutrition Activity, as part of learning from its forerunner project ENGINE, hired consultants to undertake an assessment on the performance of ENGINE's Backyard Improved/Local Chicken Performance, implemented by smallholder farmers in four regional states. The study used both quantitative and qualitative data. A total of 253 households were selected through convenient sampling from twelve intervention woredas of the four regions and interviews using structured questions. Focus group discussions (FGD) and key informant interview (KII), case studies and observation were also conducted to validate the findings of the assessment. The findings of the assessment showed that 71 percent of chicken management is conducted by women. Out of the 253 households interviewed, 71 percent of the respondents are engaged in agriculture with work experience between 4 and 9 years. The study indicated that chicken distribution package (chicken, formulated feed, vaccination, housing and training) was not 100 percent complete and uniform in distribution to target households. Among respondents interviewed, 99% received training on improved chicken management. Once ENGINE distributed feed was completed, 99 percent of the households practiced feed supplementation in the form of formulated feed (70%) and grain (74). Though it was not regular and uniform in the regions, 84 percent of the respondents got their chickens vaccinated at least once after receiving the chickens. Similarly, 86 percent of the respondents have a fenced chicken house and restrict visitors from accessing their farms. However, abandoning litters and dead chickens in the surrounding was practiced by 65 percent of the respondents. Reception of extension service at least one time reported by 83 percent of the respondents. To sustain improved chicken farming, natural hatching using broody local hen practiced by 70 percent of the respondents. It was reported by 82 percent of the respondents that disease is the major constraint for improved chicken farming. Out of total respondents, currently, 45 percent in Tigray, 34 percent in Oromia, 33 percent in Amhara and 3 percent in SNNP still keep chicken of Koekoek breed. 96 and 73 percent of the respondents respectively replied consuming egg and chicken meat. Income up to 2,386 Birr per target farmers was reported earned during the project period. A total of 155 farmers adopted improved chicken farming from the ENGINE target households as the result of diffusion. In conclusion, target households improved their consumption and earned economic benefits from the distributed chicken and the intervention has played important role in disseminating technology appropriate to farmers. We conclude that farmers targeted by the project have the capacity to keep improved

chicken provided that the intervention is supported with extension service on feeding and veterinary service.

## **II. Introduction**

To further substantiate the benefits of the improved chicken farming to the target households and to foster learning from previous ENGINE's work, Land O'Lakes International Development, the technical lead of Growth through Nutrition activity, has hired a consultant firm to **“Evaluate and draw key Lessons on Improved chicken supply chain and backyard improved chicken performance at smallholder farmers’ management”**. Accordingly, we undertook a comprehensive study compiled this report.

Family poultry production, which encompasses both extensive and small-scale intensive management systems, is practiced by most households in low-income food-deficit countries. Despite low production levels and potentially high losses due to disease, predation and theft, scavenging systems offer the advantage of requiring minimal land, labour and capital inputs. Human under nutrition remains a major public health challenge globally, contributing to over three million preventable maternal and child deaths each year. Animal source foods, including poultry (meat and organs) and eggs, provide high-quality protein and micronutrients in bio available forms which, even in small quantities, substantially increase the nutrient adequacy of traditional diets based on staple crops. Women are recognized as key players in family poultry production systems and successful engagement with this sector should incorporate gender-sensitive approaches. Agricultural interventions which target women are more likely to lead to positive nutritional outcomes without compromising their time for child care practices. A multi-disciplinary research approach, multi-sectoral involvement within government institutions and the implementation of policies which target smallholder farmers is needed to maximize the potential impact of improvements to family poultry systems on food and nutritional security.

According to the information obtained from the ENGINE office, key informants and participants of focus group discussions, ENGINE distributed 15,200 chickens to 1080 poor households in 2012-2015, in the four selected regional states; Amhara, Tigray, Oromia and SNNP regional states. The households have been selected based on their extreme poverty level and exposure to nutritional deficiency. ENGINE provide the households with a two-day comprehensive and “hands-on” training on chicken management. ENGINE also contributed

industrial materials for chicken house construction, while the beneficiaries contributed labour and local materials to construct compartmentalized chicken houses. ENGINE distributed the Koekoek breed, which is adaptable to sub-standard management conditions, disease and is self-reproducible. The chickens were vaccinated prior to distribution. ENGINE equipped households with formulated feed sufficient until the pullets start laying eggs. To ensure post distribution health management, like vaccination and medical treatments services, the households were linked to local public veterinary health centres. The number of distributed chicken per target households varies between the regions based on the package size established by the respective regions. Each household in all regions, except Amhara, received 12 chickens; 2 cocks and 10 pullets. In Amhara, each HH received 17 heads of chicken, 2 cocks and 15 pullets.

We learned that ENGINE's household poultry farming project, have created positive outcomes in improving dietary diversity of the target farmers. However, the above-mentioned package-base chicken distribution was not assured of scalability as it is appealed to be resource intensive. Target farmers participating in the improved chicken farming were constrained by inadequate supply and access to crucial inputs of technical know-how, feed and healthcare access and/or, affordability of inputs.

## **2.2. Objectives of the Evaluation**

1. To evaluate the effectiveness of the project through investigating how many of the ENGINE chicken recipient small holder farmers have sustained improved backyard chicken beyond project life and/or upscale or replicated beyond their family use and its contribution to nutrition and economic benefits to the target farmers?
2. To assess the sustainability through investigating which specific activities could ensure the continuity or discontinuity of backyard improved chicken farming activities in the project area.
3. To evaluate the efficiency of the project by identifying and determining cost implications for scaling up ENGINE/other agencies chicken supply and distribution to small holder farmers.
4. To assess whether there are exemplary experiences through checking the evidence for the presence of other agencies who supply improved chicken and backyard chicken farming support that have sustained beyond project life and/or copied, scaled up or replicated beyond the immediate project area?

5. To assess the impacts of the project on social, cultural, economic, environmental, and policy environment that enable or hinder sustained improved chicken supply to and farming by smallholder farmers? And make recommendation for the project to consider?
6. To draw important lesson learned and forward recommendation for the future on improved chicken supply and farming by smallholder farmers and define key strategic options for exit strategy, replication, scaling up and sustainability.

### **III. Methodology**

#### **3.1 Research Design**

The study employed both quantitative and qualitative research and employed data collection methods, such as questioner survey, key informant interview (KII), focus group discussion (FGD), observation and case studies. Apart from primary information obtained through these data collection methods, the study consulted secondary sources such as preliminary/progress reports of the project and published documents of similar interventions by different organizations.

#### **3.2 Sampling Method**

The study population is comprised of project target farmers and agricultural experts selected from woredas of Tigray, Amhara, Oromia and Southern Nations and Nationalities Peoples (SNNP) Regional states.

In the four regional states, ENGINE provided improved chicken support for 1081 target farmers. For this study, it has been planned to take a sample of 25% (270) households based on convenient sampling (non-probability sampling) in consultation with ENGINE officials. As the number of target farmers included in the project is different across every region, the total number of sample households has been assigned proportionally to each region. The target woredas accommodating the proportional sample size of households in every region were selected based on purposive or convenient sampling method in consultation with Growth through Nutrition project staffs. Accordingly, the selected study woredas were Edamehoni and Tahtay Adiabo (Tigray Region), Dejen, Wonberima, Alefa, Dangila and DebubAchefer (Amhara Region), Ada'a, JimmaGeneti and Ambo (Oromia Region), and Wondo Genet and MerabAzernetBerbere (SNNP Region). Finally, all target farmers (270 Households), in these selected woreda were designed to be included in the study. Accordingly, the lists of all targeted

farmers were prepared and from the list of households in the respective sampled woredas 253 were found and interviewed while the rest 17 were not found at time of the interview.

Additionally, four key informant interviews, three focus group discussions, three case studies and observation of brooding and hatching facilities in Oromia and Amhara Regions, have been conducted.

### **3.3 Methods of Data Collection**

#### **3.3.1 Survey**

Semi-structured questionnaire was prepared, pretested and data were gathered from a total of 253 households by ten trained enumerators. The collected data were focusing on issues related to ENGINE project chicken support supply such as package of the chicken supply, adoption of the chicken technology, methods of chicken husbandry and management, extension service and technical support provided by relevant stakeholders, benefits of the chicken support, and challenges which the targeted farmers were facing.

#### **3.3.2 Key informant interview**

Separate interviews were held, in 2 woredas, with 4 agricultural office experts (2 experts from Merab Azernet woreda and the other 2 from Ada'a woreda) who have been involved and have better knowledge on the activities of ENGINE poultry project. The interview focused on questions that helped to elicit how the chicken support activity was carried out and benchmarking experiences of other agencies' improved chicken support supply.

#### **3.3.3 Focus group discussions**

A total of 4 focus group discussions were conducted with ENGINE chicken support target farmers. Of which 2 were conducted at Merab Azernet woreda while the other 2 were at Ada'a woredas. FGD participants were free and confident to express their opinions. In doing so the first two groups were entirely women and the other two groups were a mixture of woman and men participants. The main agendas of discussion in both cases are attached with this report.

#### **3.3.4 Case studies**

Successful households were identified based on referral from other members of the chicken group being successful in chicken farming from the project support. Instances of success are included in this report.

### 3.4 Data analysis and interpretation

Since the study has employed convenient sampling, the research method applied in this study is descriptive research. The data collected through different methods were organized into different categories in accordance with specific objectives of the study. The data collected through the semi-structured questioner, were entered into computer database and analysed using Statistical Packages for Social Sciences (SPSS). Descriptive statistic such as percentage, frequency and mean were processed and interpreted. Data explored through other sources, (KII, FGD, case study and observation) have been organized into major and sub-themes and appropriate narrations have been made to interpret the information.

## IV. Findings of the Evaluation

### 4.1. Household Characteristics

Most of the respondents were female and fall in young-adult age category. None of the respondent households had infants less than two years old. Agriculture was the mainstay of the respondents as reported by 71 percent of the interviewed households. Casual labour in Oromia and SNNP was found to be 40 and 28 percent respectively. Compared to 2015 national average adult literacy rate of Ethiopia, the reported illiteracy rate of 68 in Amhara and 71 in Oromia was found to be high. A high illiteracy rate hinders improved chicken farming as a business and partly affects sustained chicken farming. Therefore, the chicken management training needs to focus on adult literacy trainings besides the technical training. Chicken farming experience ranges between four and nine years as reported by the respondents. Out of the total respondents, on average 73 percent were married, 11 percent are divorced and widowed respectively, while six percent are single with observable variation among the regions (Table 1).

Table1. Household Characteristics, by Region

Household Characteristics	Total	Region			
		Tigray	Amhara	Oromia	SNNP
Sex of the respondent (%)					
Male	1.0	0.0	2.7	0.0	0.0
Female	99.0	100	97.3	100	100

7

Age of the respondent (Mean)	31	29	34	31	31
Household size by age (Mean)					
< 2 years old	0.0	0.0	0.0	0.0	0.0
2 - 5 years old	1.0	1.0	0.0	1.0	1.0
5 - 15 years old	2.0	1.0	2.0	2.0	3.0
15 - 49years old	2.0	2.0	2.0	2.0	2.0
> 49 years old	0.0	0.0	0.0	0.0	0.0
Main job of the respondent (%)					
Farming	71	84.2	82.9	46.2	69.2
Petty trade	10	13.2	11.7	13.8	2.6
Casual labour	19	2.6	5.4	40.0	28.2
Education status of the respondent (%)					
Illiterate	61.2	42.1	68.5	70.8	43.6
Read and write	4.0	2.6	2.7	1.5	12.8
Elementary school	29.6	44.7	21.6	26.2	43.6
Secondary school	5.1	10.5	7.2	1.5	0.0
Chicken farming experience (Mean, years)	7.0	7.0	9.0	4.0	9.0
Marital status (%)					
Married	73	57.9	63.1	90.8	79.5
Divorced	11	34.2	5.4	3.1	0.0
Single	6.0	5.3	13.5	1.5	2.6
Widow/widower	11	2.6	18.0	4.6	17.9

## 4.2. Improved Chicken Distribution Package

The study indicated that chicken distribution package was not 100 percent complete and uniform in terms of distribution among the targeted households. Poultry feed distribution appropriates the highest rate, (97%) of the targeted farmers, while veterinary package covers the least (37%) of the beneficiaries, as indicated in Table 2 below. All chicken had received vaccination prior to the distribution, but target households perceived that veterinary service was inadequately included in a package. This is justifiable by the chicken sickness and death they have encountered. The result of the study also shows that all the poultry farming package components were not distributed uniformly among the chicken recipient households and feeding through is the least distributed one covering only 65% of the targeted farmers. Hence, future programs should consider full package chicken distribution, particularly the post distribution veterinary service, which requires robust action and commitment from the existing livestock extension service.

Table 2. The package of chicken supplied to respondents, by Region (%)

Region	Feed	Housing	Veterinary service	Feeders	Drinkers	Training
Tigray	92.1	100.0	47.4	0.0	0.0	97.4
Amhara	97.3	99.1	42.3	75.7	99.1	85.6
Oromia	100.0	86.2	20.0	69.2	95.4	70.8
SNNP	94.9	76.9	43.6	89.7	97.4	76.9
Total	96.8	92.5	37.5	64.8	83.0	82.2

*Percentage values across each region is greater than 100, multi-response variable*

Respondents reported that comprehensive chicken management training was provided prior to chicken distribution. The finding shows that improved poultry management was covered well in the training, as reported by 93 percent of the respondents. The least covered topic was financial management (55%). As financial and adult literacy are crucial for chicken farming as a business and key to sustaining improved chicken farming, they require due attention both prior and post project initiation.

Table 3. Topics of training for improved chicken production, by Region

Region	The number of respondents who have mentioned at least one topic of training	Topics of training on improved chicken production (N, %)			
		Improved chicken management	Health	Feeds and feeding	Financial management
Tigray	37	28 (75.7)	36 (97.3)	31 (83.8)	32 (86.5)
Amhara	110	109 (99.1)	101 (91.8)	84 (76.4)	83 (75.5)
Oromia	65	61 (93.8)	31 (47.7)	56 (86.2)	10 (15.4)
SNNP	38	35 (92.1)	29 (76.3)	33 (86.8)	13 (34.2)
Total	250	233 (93.0)	197 (78.8)	204 (81.6)	138 (55.2)

### 4.3 Husbandry and Management

The feeding situations after the close out of ENGINE support is shown in Table 4. The result of the study shows that households in all regions used to practice supplementary feeding of improved chicken after the support from ENGINE has stopped. Scavenging together with formulated feed supplementation was practiced by 71 percent of the respondents while scavenging with grain supplement was practiced by 74 percent of the respondents. One of the ongoing supervision reports produced by the ENGINE office indicates that around 91 percent of the farmers prepare formulated feed at their houses<sup>2</sup>. Scavenging was practiced in Amhara by only two percent of the respondents. This is a good indication of poor farmers' interest to invest in their chickens to get better yields and it demonstrates the success of the project in promoting simple chicken feed formulation techniques using local feed resource bases.

Table 4. Methods of feeding after the feed supplies by the project is stopped

Region	The number of respondents who have mentioned at least one feeding method	Methods of feeding chicken feed (N, %) **		
		Scavenging supplemented with own formulation/purchased	Scavenging supplemented with grains	Only scavenging
Tigray	38	34 (89.5)	20 (52.6)	0 (0.0)
Amhara	111	71 (64.0)	105 (94.6)	2 (1.8)
Oromia	65	48 (73.8)	39 (60.0)	0 (0.0)
SNNP	39	26 (66.7)	23 (59.0)	0 (0.0)
Total	253	179 (70.7)	187 (73.9)	2 (0.79)

\*\* Percentage values across each region is greater than 100, multi-response variable

As indicated in Table 5 below, 79 percent of the respondents reported that they assign a household member responsible to manage the chicken. Women attendants were assigned by 81 percent of the respondents while 12.6 and 6 percent of the target farmers have assigned men and children respectively. This indicates that the project is mostly successful in getting the women involved in the poultry farm management. Chicken interventions are opportunities for women's empowerment and improved nutrition, as women are the decision makers on what the family should eat. The time spent in managing the improved chicken on average was 68 minutes per day (Table five below). The work load on women due to the chicken activity is very minimal that makes chicken intervention again more appropriate to improve nutritional status of vulnerable households. But awareness and family focused training should be provided so that any work burden because of household chicken farming should be shared among other family members so that mothers will have time for other tasks.

Table 5. Household members managing the chicken and time spent/day, by Region

Region	Assigned a household member responsible to manage the chicken (N, %)	Household members' given responsibly to manage the chicken (N, %)			Average time spent for managing the chicken (minutes/day)
		Men	Women	Children	
Tigray	35 (92.1)	6 (17.1)	29 (82.9)	0 (0.0)	55
Amhara	82 (73.9)	6 (7.3)	70 (85.4)	6 (7.3)	83
Oromia	50 (76.9)	8 (16.0)	42 (84.0)	0 (0.0)	44
SNNP	32 (82.1)	5 (15.6)	21 (65.6)	6 (18.8)	89
Total	199 (78.7)	25 (12.6)	162 (81.4)	12(6.0)	68

#### 4.4 Health and Bio-security

**Vaccination:** The vaccination practice and frequency by the respondents is shown in Table 6. It was reported that 84 percent of the respondents get their chicken vaccinated at least once. The highest proportion was recorded in Amhara (96%) and the lowest in Tigray (63%). Vaccination frequency of 1 to 2 times was practiced by 49 percent of the respondents while 3-4 times chicken vaccination reception was reported by 24 percent of the respondents. Vaccinations of more than four times were practiced only by 11 percent of the respondents, in Tigray and Amhara Regions. Given the duration that the chickens were reared, the reported chicken vaccination frequency is very low. Therefore, future chicken distribution should be implemented based on the standard chicken vaccination program advised by the national Veterinary Institute (NVI) and the woreda livestock and fishery offices need to be given due emphasis in the advancement of the provision vaccination services.

Table 6. The vaccination status of chicken after the delivery to participant farmers, by Region

Region	Vaccination provided for their chicken (N, %)	Frequency of vaccination provided (N, %)			
		1 - 2 times	3 - 4 times	4 - 5 times	More than five times
Tigray	24 (63.2)	15 (65.2)	6 (26.1)	2 (8.7)	0 (0.0)
Amhara	107 (96.4)	43 (41.4)	41 (39.4)	16 (15.4)	4 (3.8)
Oromia	47 (72.3)	44 (93.6)	3(6.4)	0 (0.0)	0 (0.0)
SNNP	35 (89.7)	21 (63.6)	12 (36.4)	0 (0.0)	0 (0.0)
Total	213 (84.2)	123 (48.6)	62 (24.5)	18 (7.1)	4 (1.58)

**Farm bio-security:** Most of the respondents, (86%), have fenced and restricted visitors and intruders from accessing into their poultry farm yards and tried to avoid contacts with excrement. However, 67 percent of the respondents littered the dead chicken and 37 percent of the respondents buried while only 3.2 percent of them have incinerated (Table 7 below).

Littering dead chickens is a wrong practice that chicken farming communities should improve and get advised as this is the potential cause of high disease pressure in and around the chicken house. Such practice creates inductive environments for incubation of disease causing agents and levy big burden on the veterinary operations.

Table 7. Chicken farm bio security, disposing system of dead body chickens, by Region

Region	Fenced their chicken house (N, %)	The number of respondents mentioned at least one method of disposing died chicken	Methods of disposing died chicken (N, %) **		
			Burry	Burn	Abandon
Tigray	34 (89.5)	38	9 (23.7)	0 (0.0)	31(81.6)
Amhara	86 (77.5)	110	47 (24.7)	2 (1.8)	70 (63.6)
Oromia	65 (100)	65	24 (36.9)	4 (6.2)	41 (63.1)
SNNP	33 (84.6)	37	13 (35.1)	2 (5.4)	22 (59.5)
Total	218 (86.2)	250	93 (37.2)	8 (3.2)	164 (65.6)

\*\* Percentage values across each region is greater than 100, Multi-response variable

#### 4.5 Extension Service and Technical Support

Table 8 below reveals that 83 percent of the respondents received extension service at least once during their entire chicken rearing period. The highest frequency for receiving extension service is once in a month, as reported by 64 percent of the respondents. The respondents were visited by the extension workers during the delivery of chickens, construction of poultry house, vaccination and occurrence of disease. This is generally common for all regions considered in this study (Table 9). Most respondents (93%) were visited by the extension workers during input provision (Table 10). Only 56 percent of the respondents received technical support whenever they had encountered problems which are beyond their capability to manage. Extension service regularity and frequency is not to the expected level but to sustain improved chicken farming by the rural poor farmers a doable extension workers' engagement strategy should be designed and exercised. Therefore, capacitating the local extension workers and creating working environments for them should be given due regards. Particularly mainstreaming of this kind of community project in to the formal work plan of the concerned local agency should deserve prior attention by all stakeholders mainly by the political and administrative segments of governments under consideration.

Table 8. Chicken recipient households access to extension service, by Region

Region	Respondents received extension service (N, %)	Frequency of access to the extension service (N, %)					
		Once in a year	Once in a month	Twice in a week	Once in a Week	Once in 3 months	Twice in a month
Tigray	26 (68.4)	0 (0.0)	18 (69.2)	3 (11.5)	2 (7.7)	1 (3.8)	2 (7.7)
Amhara	108 (97.3)	0 (0.0)	68 (63.0)	5 (4.6)	19 (17.6)	16 (14.8)	0 (0.0)
Oromia	39 (60.0)	1 (2.6)	32 (82.1)	2 (5.1)	0 (0.0)	4 (10.3)	0 (0.0)
SNNP	37 (94.9)	2 (5.4)	17 (45.9)	2 (5.4)	1 (2.7)	15 (40.5)	0 (0.0)
Total	210 (83.0)	3 (1.4)	135 (64.3)	12 (5.7)	22 (10.5)	36 (17.1)	2 (1.0)

Table 9. Conditions of chicken recipient household extension service reception, by Region

Region	The number of respondents who have mentioned at least one aspect	The time when the target household received extension service (N, %) **					
		During house construction	During input provision	During vaccination	Whenever disease occurs	During credit collection	Up on request
Tigray	26	4 (15.4)	13 (50)	23 (88.5)	22 (84.6)	1 (3.8)	11 (42.3)
Amhara	108	68 (63.0)	59 (54.6)	62 (57.4)	87 (80.6)	28 (25.9)	26 (24.1)
Oromia	39	30 (76.9)	3 (7.7)	15 (38.5)	11 (28.2)	2 (5.1)	1 (2.6)
SNNP	37	31 (83.8)	26 (70.3)	28 (75.7)	21 (56.8)	0 (0.0)	14 (37.8)
Total	210	133 (63.3)	101 (48.1)	128 (61.0)	141 (67.1)	31 (14.8)	52 (24.8)

\*\* Percentage values across each region is greater than 100, multi-response variable

Table 10. The time when the farmers visit extension workers

The time when farmers visit extension workers	Responses		Percent of cases **
	N	Percent	
Planning to start chicken farming	64	25.5	50.8
During input provision	117	46.6	92.9
Any time when there is technical problem	70	27.9	55.6
Total	251	100.0	199.3

\*\* Multiple response variables. 126 out of 253 respondents answered the question the percentage is calculated accordingly

As shown in Table 11 below, 88 percent of the respondents need technical support on chicken housing seconded by chicken health and management as reported by 73 percent of the respondents. As indicated in Table 11 below poultry housing, health, feed preparation and management are the technical gaps felt by the respondents.

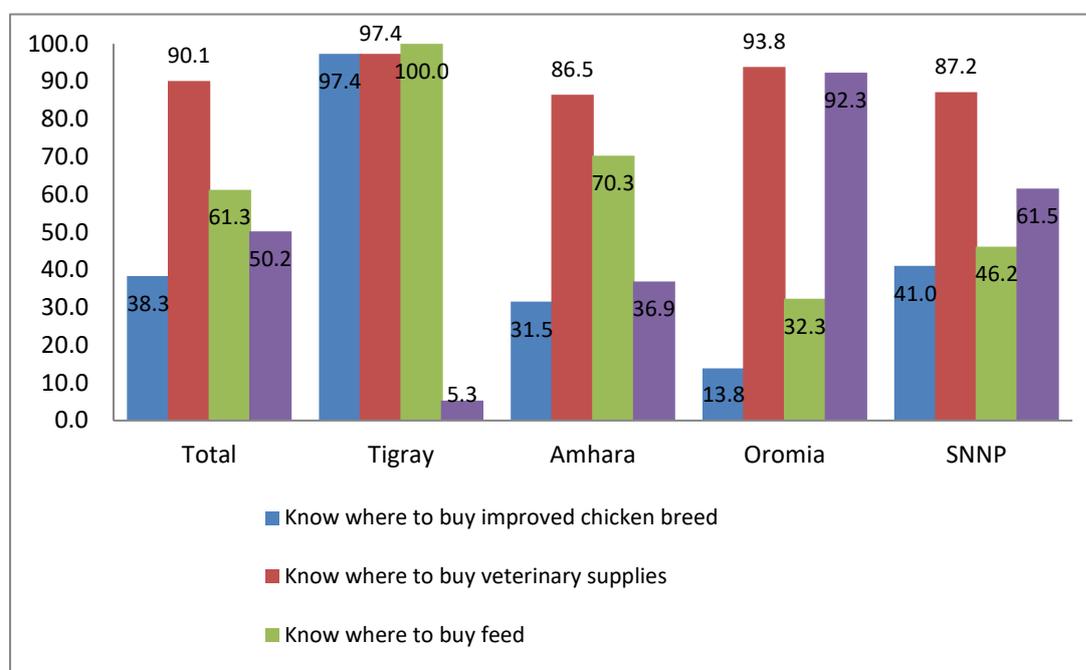
Table 11. Areas in which target farmers need technical support, by Region

Region	The number of respondents who have mentioned at least one technical support	Areas that farmers need technical support (N, %) **					
		Chicken health	Chicken feeds	Chicken Management	Chicken egg/meat consumption	Chicken marketing	Chicken housing
Tigray	38	36 (94.7)	20 (52.6)	35 (92.1)	3 (7.9)	2 (5.3)	14 (36.8)
Amhara	109	97 (89.0)	84 (77.1)	72 (66.1)	37 (33.9)	52 (47.7)	59 (54.1)
Oromia	63	23 (36.5)	19 (30.2)	46 (73.0)	5 (7.9)	1 (1.6)	1 (1.6)
SNNP	28	18 (64.3)	18 (64.3)	20 (71.4)	2 (7.1)	3 (10.7)	14 (50.0)
Total	238	174 (73.1)	141 (59.2)	173 (72.7)	47 (19.7)	58 (24.4)	88 (37.0)

\*\* Percentage values across each region is greater than 100, multi-response variable

In this study, farmers' knowledge of where to access crucial inputs after project closure was assessed. 91percent of the respondents know where to get veterinary service while 61 percent of them know where to buy poultry feed. Respondents know where to buy the chicken breed is the lowest one, or 38 percent of the total target farmers. Therefore, engaging private sectors in poultry feed supply, provision of veterinary service, availing improved chicken should receive due attention both during the planning and implementation phase of this kinds of community targeting projects.

Figure 1. Chicken recipient households' level of information on where to get crucial inputs, by region



#### 4.6 Production and Productivity of the Chicken farming

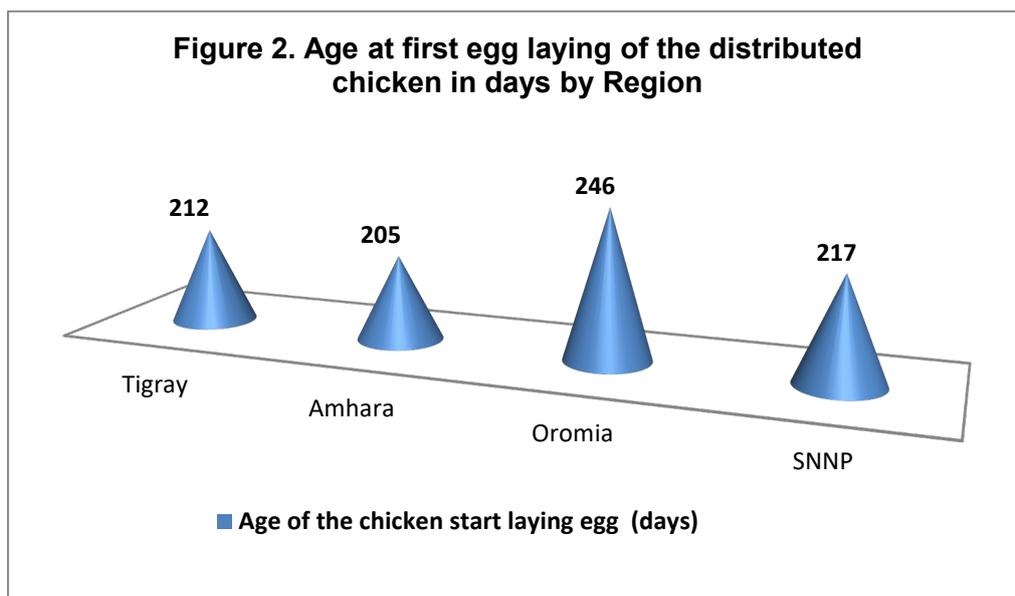
Age at first egg laying and hatching performance, taken as indicator of overall performance of the improved chicken farming of ENGINE, is presented in Table 12 and Figure 2 below. The

result of the study shows that more than 75 percent of the respondents in Tigray, Oromia and SNNP have hatched eggs from improved chicken they have received from ENGINE, using local broody hens while 54 percent of the farmers in Amhara regional state did so. Since the target farmers were using local broody hens, they could set about 9-12 eggs at a time. Respondents in all regions set eggs at least twice in a year. The hatchability was more than 70 percent which is comparable to the reported Koekoek breed reproductive parameters of 78 percent hatchability, as reported in the farms of DZARC and South African ARC- Animal Production Institute (2010). In SNNP Region the hatchability performance was only 58% which is by far below as compared to the other regions.

According to the result of the study, the pullets distributed to the target farmers started laying eggs as early as 205 days and as late as 246 days since incubation (Figure 2). It indicates that there is a considerable delayed in egg laying performance. The data is subject to recalling bias by farmers since they do not keep record. Therefore, it should be taken with precautions. Commonly with the Koekoek breed the first egg laying starts 165 days since incubation with proper management, as reported by DZARC.

Table 12. Hatching and hatching performance, by Region

Region	Hatch chicks using local broody hen (N, %)	Average frequency of eggs setting/year	Average number eggs set at a time	Average number chicks hatched at a time	Hatchability (%)
Tigray	29 (76.3)	3	13	9	73.6
Amhara	60 (54.1)	2	13	10	77.0
Oromia	50 (76.9)	2	12	9	73.5
SNNP	29 (74.4)	2	9	5	58.1



## 4.7 Consumption and income benefits from the improved chicken farming

### 4.7.1 Nutritional Benefits: Consumption of egg and chicken meat

According to Table 13 below, consumption of poultry meat and eggs is common in all regions of the study. In Tigray, chicken meat consumption is more common (95%) than egg consumption (92%). In the rest of regions, egg consumption is more common than chicken meat consumption (table 13). Generally, 96 percent of the respondents have enjoyed the consumption of eggs. This has also been confirmed from the internal document of ENGINE<sup>2</sup> regarding consumption of chicken eggs, children under 5, between 5 - 15 years old and pregnant women were given priority. However, most households provide chicken meat to all household members without any distinction (Table 14 and Table 15).

Table 13. Egg and chicken meat consumption, by Region

Region	Egg consumption (N, %)	Chicken meat consumption (N, %)
Tigray	35 (92.1)	36 (94.7)
Amhara	104(93.7)	91(82.0)
Oromia	65 (100.0)	28 (43.1)
SNNP	39 (100.0)	30 (76.9)
Total	243 (96.0)	185 (73.0)

Table 14. Priority of egg consumption among household members

Household members given priority to consume egg	Responses		Percent of cases **
	N	Percent	
Children under five years	171	30.7	70.4
Children aged 5 -15 years	135	24.2	55.6
Pregnant women	71	12.7	29.2
Lactating women	66	11.8	27.2
Father	61	11	25.1
All household members share without any priority	41	7.4	16.9
The rest household members	12	2.2	4.9
Total	557	100	229.3

\*\* Multiple response variables. 243 out of 253 respondents answered the question

Table 15. Priority chicken meat consumption among household members

Household members given priority to consume chicken meat	Responses		Percent of cases **
	N	Percent	
All household members share without any priority	106	31.8	57.3
Children under five years	53	15.9	28.6
Children aged 5 -15 years	53	15.9	28.6
Father	37	11.1	20
Lactating women	32	9.6	17.3
Pregnant women	28	8.4	15.1
The rest household members	24	7.2	13
Total	333	100	197.9

\*\* Multiple response variables. 185 out of 253 respondents answered the question

#### 4.7.2 Income

The result of the study shows that participants of the improved chicken project intervention in all regions have sold chicken and chicken products. Selling eggs, hens and cockerels is common as compared to selling of chicks and pullets (Table 16).

Table 16. Selling of chicken and chicken products

Types of chicken products/chicken	Responses		Percent of cases **
	N	Percent	
Egg	240	41.8	95.2
Hen	135	23.5	53.6
Cock	111	19.3	44.0
Cockerels	43	7.5	17.1
Pullet	39	6.8	15.5
Chicks	6	1.0	2.4
Total	574	100	227.8

\*\* Multiple response variables. 252 out of 253 respondents answered the question

The average income obtained by individual participant household (Ethiopian Birr) in all regions is shown in Table 17. The income represents the income earned during the intervention period. The highest source of income was sells of eggs followed by sell of hens and young cocks (cockerels).

Table 17. Average income earned from sell of chicken and chicken products

Sources of Income	Average Income ETB)
Egg (N=238)	2386.04
Hen (N=135)	755.19
Cock (N=110)	420.82
Pullets (N=37)	493.11
Cockerels (N=40)	579.19

ETB: Ethiopian birr

Note: The total income cannot be calculated as not all households sold each of the products listed

The case study also indicated that the chicken support has been contributed for asset building as the income obtained from the sale were reinvested in the form of other livestock purchase and eventually contributed to lift-up the most vulnerable households from poverty.

**Case example:** W/o. Rehina Shekuralh is living in Woger Jinjibel Kebele, Merab Azernet Berbere Woreda. She was identified as MVHHs and included in ENGINE chicken distribution scheme. She received 2 cocks 10 pullets aged three months old. She kept the chicken for about 2 years. After 2 years of rearing the chicken, productivity of the chicken decreased, and she decided to sell them out. She earned 1800 Ethiopian Birr (ETB). From the sales of the chickens. This revenue was reinvested on purchasing pregnant sheep for breeding purpose. Luckily enough the sheep gave birth to twins. When the offspring reached to marketable size, again she sold them out and her total capital hiked to 2800 ETB. Adding extra amount of 1000 ETB from her savings, she bought a heifer. As per socio-economic stratification owning larger domestic cattle like heifer is a sign of economic betterment. Maintaining such natural trend of economic growth is appreciated but it should not be in the expense of chicken farming.

#### 4.8 Sustainability of the Improved Chicken Support

The current holding status of improved chicken by the target farmers is presented in Table 18 below. The proportion of households who are keeping improved chicken out of the total sample was highest in Tigray (45%), followed by Oromia (34%) and Amhara (33%) and the least in SNNP (3%). The highest flock size of nine chickens per household followed by six heads of birds is reported in Tigray and Amhara regions respectively. The current chicken flock size in

the two regional states is almost half of the beginning stock size distributed by the project. However, at the project level the average number of chickens retained up until the time of the study is 3 chickens per household under consideration (Table 18 below). Nearly 70 percent of households, included in the survey, have quitted keeping improved chicken farming at the time of the survey. This inform the project to invest on improving animal health service by engaging private actors and knowledge development on maintaining breeding stock to sustain improved chicken farming.

Table 18. The existing chicken stock, by Region

Region	Number of sampled households	Households keeping improved chicken (N, %)	Average number chicken kept per household		
			Adult	Chicks	Total
Tigray	38	17 (44.7)	7	2	9
Amhara	111	37 (33.3)	5	1	6
Oromia	65	22 (33.8)	2	1	3
SNNP	39	1 (2.6)	1	0	1
<b>Total</b>	<b>253</b>	<b>77 (30.4)</b>	<b>5</b>	<b>1</b>	<b>3</b>

Adopters of improved chicken farming by emulating ENGINE lead famers were estimated to be 155 farmers as shown in Table 19 below. ENGINE chicken recipient households were serving as fertile egg suppliers that their neighbours were put under a broody local hen and eventually get hatched chicken of same type to that of ENGINE targeted households. This indicates the contribution of the project in replicating technologies beyond the planned nutrition outcomes on mothers and children.

Table 19. The number of farmers started improved chicken production by copying/buying chicken or fertile egg from ENGINE target farmers, by Region

Region	The number of farmers copied improved chicken production (N, %)				
	Total	1 - 2 chicken producers	3 - 4 chicken producers	5 - 6 chicken producers	More than 6 chicken producers
Tigray	14 (9.0)	7(50.0)	5 (35.7)	0 (0.0)	2 (14.3)
Amhara	74 (47.7)	10 (13.5)	27 (36.5)	15 (20.3)	22 (29.7)
Oromia	46 (29.7)	13 (28.3)	16 (34.8)	12 (26.1)	5 (10.9)
SNNP	21 (13.5)	10 (47.6)	8 (38.1)	1 (4.8)	2 (9.5)
Total	155 (100)	40 (25.8)	56 (36.1)	28 (18.1)	31 (20.0)

#### 4.9 Challenges of Improved Poultry Production

The challenges that hindered respondents from further expanding improved chicken farming are shown in Table 24 below. The result of the study shows frequent occurrence of disease, as reported by 82 percent of the respondents, was the main constraint hampering chicken farming seconded by predation as reported by 24 percent of the respondents. Failure to multiply the stock and selling out of improved chickens to replace them with other livestock are the third and fourth main reasons for gradual downsizing and ultimate termination of improved chicken farming by the target households. Beyond the reported challenges that the chicken recipient households have encountered, the inadequate extension service have also contributed for the observed failure as it is substantiated by the KII findings from SNNP (see below).

One of the key informants from office of agriculture in Mierab Azernet woreda of SNNP regional state has witnessed that the chicken distribution was not fully institutionalized or well mainstreamed along with the routine development activities of the agricultural office of the woreda, kebele and village level government structures. Unless paid or participated in the project in different forms, experts see the project chicken work as “project business”. Earlier said key informant was the ENGINE focal person and in the middle of his interview he quoted what people were saying in Amharic to person in charge of supporting the chicken recipient households when project staff came to her was “*SewocheshMetulsh*” which is equivalent to saying “*your people are coming.*” Again, as conformed by the KII respondent frequent occurrence of disease was found to be the main reason for farmers to stop keeping improved chicken farming.

Table 24. Reasons for stopping improved chicken production, by Region

Region	Reasons for stopping improved chicken production (N, %) **
--------	------------------------------------------------------------

	The number of respondents mentioned at least one reason	Failure to multiply the breed at hand	Shortage of knowledge	Insufficiency of extension support	Frequent occurrence of disease	Frequent predator attack	Sold & changed to other livestock
Tigray	21	1 (4.8)	1 (4.8)	0 (0.0)	15 (71.4)	6 (28.6)	0 (0.0)
Amhara	74	11 (14.9)	11 (14.9)	7 (9.5)	65 (87.8)	17 (23.0)	2 (2.7)
Oromia	43	0 (0.0)	3 (7.0)	2 (4.7)	43 (100.0)	1 (2.3)	0 (0.0)
SNNP	38	8 (21.1)	2 (5.3)	8 (21.1)	22 (57.9)	19 (50.0)	14 (36.8)
Total	176	20 (11.4)	17 (9.7)	17 (9.7)	145 (82.4)	43 (24.4)	16 (9.1)

*\*\* Percentage values across each region is greater than 100, multi-response variable*

Further, the other challenges of the improved chicken production at farmers' household level, as reported by the respondents, is the ever-growing hike in the price of poultry farm inputs as outlined in Table 25 below. Improved chicken breed followed by commercial chicken feed is the first highest ranked inputs. Housing seconded by medication are the third and fourth costly inputs reported by the respondents, but vaccination of chicken were the least costly but the most non-available input. This indicate that preventable diseases of chicken that was reported as the major hindrance of improved chicken farming can be prevented by employing proper chicken vaccination given that there was effective community vaccination program in the country.

Table 25. Ranking of improved chicken production inputs in the order of their comparative expensiveness

Type of chicken support inputs	Score	Rank
Improved chicken breed	178	1
Formulated feed	172	2
Drugs	124	4
Chicken house	167	3
Vaccine	98	5

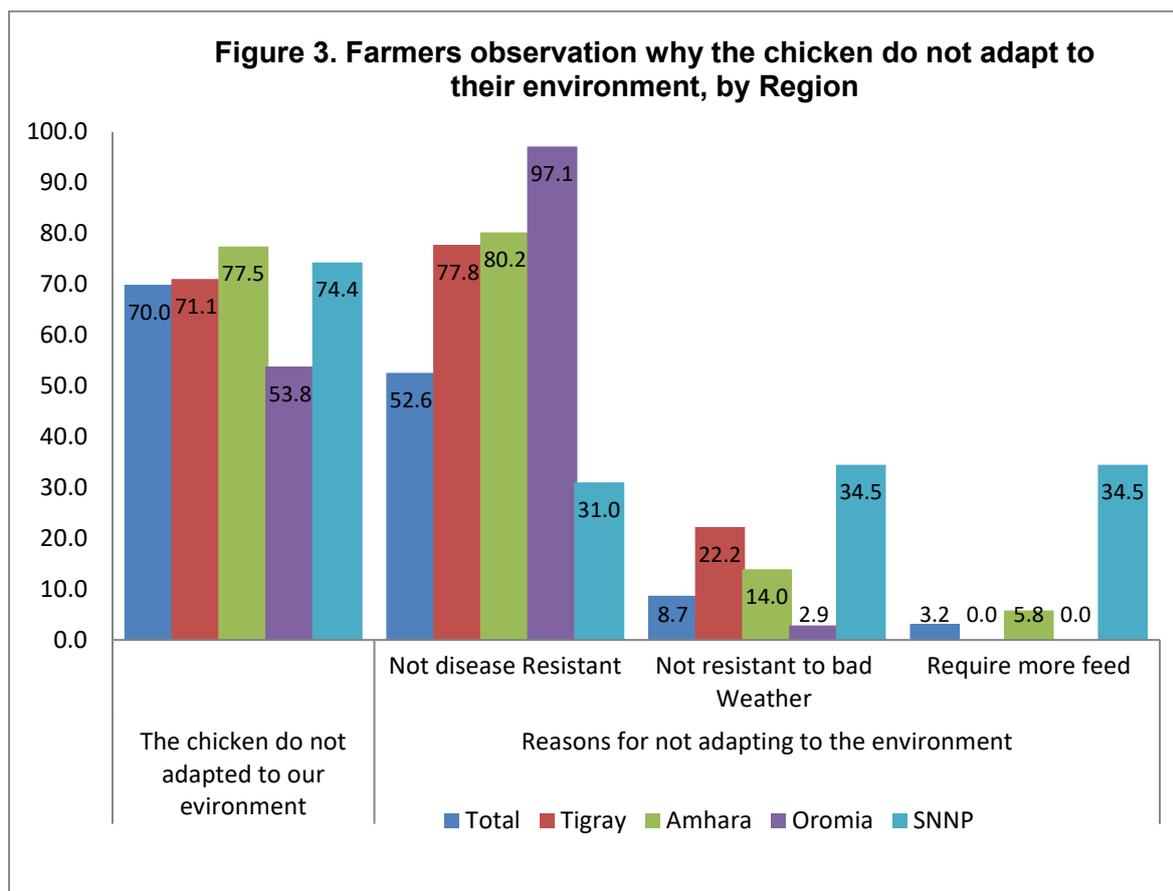
Poultry feed being one of the most important inputs; the critical season of the shortage of supply is given in Table 26 below. In all regions of the study, the households have reported that poultry feed shortage is critical during Ethiopian winter (from June to August). During this season the will, be critical shortage of grain to support the supply poultry feeds. Therefore, sufficient care must be taken not in order that the productive age of the layers match to the slack season mentioned in here.

Table 26. Critical seasons of feed shortage by region, by Region lean

Region	The number of respondents who have mentioned at least one season of feed shortage	Seasons of the year when feed shortage is critical (N, %) **	
		Autumn (September – November)	Summer (June - August)
Tigray	8	0 (0.0)	8 (100.0)
Amhara	40	12 (30.0)	39 (97.5)
Oromia	22	8 (36.4)	14 (63.4)
SNNP	25	8 (32.0)	24 (96.0)
Total	95	28 (29.5)	85 (89.5)

\*\* Percentage values across each region is greater than 100, multi-response variable

In this study the perceptions of the farmers towards the distributed chicken breed were assessed and the result is indicated in Figure 3 below. Above 70 percent of the respondents except in Oromia which is 54 percent, have indicated that the chicken breed is not adoptable to their local condition. Farmers believed that the chicken strain they received was not the right type for their environment. The main reason, according to the response of the farmers, was low disease resistance of the breed coupled by inadequate quality chicken healthcare service. This farmers' observation contradicts against the scientific knowledge on the attributes of Koekoek natural performance at low inputs and high disease pressure. Hence, further investigation must be done in this area and the future chicken distribution should focus on introducing the breed to the farmers with full packages and proper consultation with the target farmers.



## V. Discussion on the Findings

Significant numbers of the respondents in this study are female headed and female head of household; beyond a manager and caretaker of the chicken they are the principal decision makers on eggs/live animal sales and/or consumption. This has created an important opportunity for the project to impact household nutrition and economic betterment. The reason behind is that women are the custodians of what the family should eat from the poultry production and manage them properly as compared to their male counterparts. According to the findings, management of chickens, particularly in village production system, was mainly left to women.<sup>8,9</sup> However, the time spent in managing chickens is minimal; otherwise it is an additional work load and needs to be shared among other family members. Continuous nutrition education coupled with gender awareness remains instrumental in addressing this challenge. Otherwise, men will take over the role of women when the chicken flock size is growing.

We found out that for respondent households who were engaged in on-farm and off-farm related activities and experienced in agriculture, this activity served as main/or additional sources of income. Poultry project participants, however, were mainly illiterate, hindering the

transfer of information of published materials that require reading. Therefore, in the forthcoming program, it is worth mentioning that a well-designed business and adult literacy training in comprehensive chicken management training should be coherently worked out and implemented. Visual aids (pictures and small clips) can be more effective in disseminating the information to the illiterate farmers.

From this study, it was understood that not all package components (feed, vaccination, housing etc.) were fully supplied or uniformly supplied across the villages. Feed, being the most important input was delivered almost fully, but post chicken distribution veterinary support in the form of vaccinations and treatment was inadequately accessed and utilized by the chicken producers. Eventually, more than half of the target households remained with no chickens. Hence, post distribution veterinary service access and utilization requires robust planning and implementation.

Based on the survey findings, the coverage of the training both the topics and content, was effective. 50% of the respondents received pictorial poultry vaccination program, but the message from published material for illiterate farmers will not be fully understood unless the training is combined with continued refreshment training and on-site advise in their backyard observing the progress against the expected changes.

According to the findings of the study, the respondents adopted the practice of homemade feed preparation and feeding along with the termination of poultry feed support of ENGINE. This can serve as evidence as to how far the farmers are committed and willing to invest on their chicken farming despite the lack of favourable environments.

The findings have shown that vaccinations have been practiced by the project. This is the first step to protect chickens from being attacked by diseases. However, coverage alone is not enough unless it is augmented by timely provision using quality vaccine and experienced person. Proper chicken vaccination protocols against the major chicken diseases in the project areas should be designed and implemented. The fight towards the establishment of legal and official community vaccination programs at the national level should be a priority concern to all those who are involved in this kind of community-based projects. The findings of the study show that farmers control the movement of visitors/intruders into their farms. However, they also abandon dead chickens and litter around the farm. This can be one of the reasons for frequent occurrence of diseases and attracting predators which initially feed on chicken corpses

and later move to the live chicken in case of shortage of dead ones. Hence common practices of bio security measures coupled with controlling the spread of disease causing agents around the chicken farm yards play an indispensable role toward sustainability.

Active livestock extension service is very important for successful improved chicken production at farmers' household level. The findings of the study indicate that the extension service being provided by the livestock office lacks both regularity and consistency. Woreda Livestock office experts and Animal production and health development agents (DAs) assigned at Kebele level visit farmers vary in quality, mainly when they are over-burdened like during the delivery of chickens and other input provision or occasionally during the occurrences of poultry diseases. It is not only the frequency of extension service, but the quality also matters for the service seekers.

Farmers' knowledge on sources of poultry inputs is very important factor in maintaining improved chicken project in the future without dependency on aid from third party. To this end, the project should coach private input suppliers and create functional linkage among the extension agents, backyard chicken producers and private input suppliers.

The ENGINE project should receive acknowledgement and recognition for promoting adaptable and suitable chicken breed of dual purpose (egg and meat) and self-reproducing Koekoek breed. In this type of chicken breeding, hatching is crucial to maintain or add up to their flock. Attempts by the target farmers to hatching were considerably high but with minimal success rate due to the death of hatched chicken from preventable disease. Again, this heralds the importance of giving due emphasis on chicken vaccination programming.

The success of the current intervention was revealed by the evidence that the participants or target farmers used egg and meat from their improved chicken production to supplement the caloric food. In addition, they have sold poultry products to generate additional income to answer other needs. They have also developed a good perception and gentility in identifying most needy members of their family in terms of protein rich diets. In general, the intervention benefited the households both nutritionally and economically.

The presence of improved chicken, still up to the time of the survey, with those of the participant, indicates that the type of the breed distributed to the farmers can reproduce itself and some of the farmers are still successful in multiplying their flock. However, majority of

the participants have failed to maintain their stock or at least few of them due to one or more of the factors identified earlier in this paper and they are left with their squalid poultry houses.

The project assisted the dissemination technology by promoting improved chicken breed and packages. Beyond the project targets, 155 adopters have tried to copy improved poultry keeping by learning from those involved in ENGINE intervention. These 155 farmers represent 61% of the sample. It is expected that other would decide to follow suit and adopt the improved poultry farming. This would ultimately contribute to support the government's effort in increasing poultry productivity at national level through household improved chicken farming.<sup>3</sup>

In conclusion the challenges identified by participants in this study will be the real challenges to these adopters and majority of them may discontinue in some future time to come. Those target farmers who dropped the Koekoek breed have considered this breed to be as less resistant to diseases and harsh weather. This is of course quite contrary to the reports about Koekoek in Ethiopia and elsewhere<sup>6</sup>. The breed being regarded as best solution to the farmers in Ethiopia and elsewhere has failed to meet the expectations of non-adopters or drop outs. They might have not followed the recommendations given with the package.

## **VI. Conclusion**

The result of this study shows that the ENGINE intervention was positive for vulnerable household farmers. Participants that raised chickens, consumed and sold their products. Even though only 30 percent of the farmers could manage to retain some of the stocks, the benefit that was obtained from the sale and consumption was significant. The intervention has played an important role in disseminating the technology to nearby farmers. Improved chicken requires better management.

Nevertheless, the package of the intervention was not fully distributed and applied, and farmers were in shortage of some information regarding the sources of inputs and technical support. The public extension system could have played an important role if they had had the capacity and considered the project as part of their routine extension service rather than as a part time activity. The village poultry system is mainly based on poor performing chicken types that produce low with minimal or no inputs. The need for more eggs and meat is vital in villages where an animal product from ruminants is very expensive.

This study revealed that farmers have the capacity to keep improved chickens. The proportion of early adopters can be further expanded given that the pioneer farmers remain successful in poultry farming.

Delivery of inputs on time and provision of continuous follow up are crucial. The study revealed that it is not only the availability of inputs and their coverage, but proper implementation should be in place for the success of an intervention that involve poor farmers.

The exemplary role of other poultry farm developing agents should be closely investigated and more lessons should be drawn.

During site visiting, possession of land, at least sufficient to undertake poultry farming, was found to be one of the most important factor in determining the success or failure of the vulnerable household farmers in maintaining improved chicken farming.

## **VII. Recommendations**

- ❖ Even though only 30 percent of the farmers have retained the stock so far, this figure is not to be underestimated. There have been robust follow-ups and continuous supervision by all concerned bodies coupled with the provision of necessary technical and logistical assistance, such as vaccination for home based hatched chicks and market availability for ingredients of formulated feed.
- ❖ The improved poultry intervention should be continued at a similar level with all improvements mentioned here in this study and informed by the experiences of other countries.
- ❖ The Koekoek strain was the most appropriate dual-purpose chicken available in the country. The evidence from the study showed a lot should be improved for better outcome. All challenges faced by the non-adopters should be considered. The recommended size of chickens per household is 25 Koekoek layer/household along with all necessary packages (refer suggested Scheme). (N.B: 5 chickens (20%) are expected to die during the brooding period. The remaining 20 will reach grower stage and 50% of them (males) will be sold out for meat. The rest, 10 will be kept for egg production. The money from the sale of 10 males will be used to buy start up feed for laying hens)
- ❖ Instead of a blanket recommendation, thorough investigation must be carried out to vet those farmers who consider improved chickens as their priority.

- ❖ Continuous and robust follow up and supervision is a fundamental prerequisite for successful implementation of this kind of project. Therefore, proper project planning and strategy of project supervision and evaluation must be included in the initial planning phase.

### **Suggested Scheme**

1. Breed: Koekoek (dual purpose)
2. Chicken number: 25 Day-old chicks (DOCs)
3. Equipment: Hay box chicken brooder, Drinker and feeder
4. Housing: Night shelter or partial confinement
5. Vaccination: As per the NVI recommendation
6. Training: Tailor made
7. Monitoring: Biweekly
8. Feeding: Formulated feed
9. Data recording: On sell of products and purchase of inputs, hatchability

As Growth through Nutrition is targeting most vulnerable households of the community, any cost associated with improved chicken support should be covered by the project until they gain income from the sale of eggs and/or adult chicken. Farmers will be given vaccinated 25-day old chickens from a known source. Farmers will be provided hay box brooder, drinker and feeder. They will also be provided formulated feed until the chickens start to lay eggs. Hay box chicken brooder will be used to keep young chicks during day time and at night. This hay box has been proven to reduce mortality significantly by protecting chickens from predators and disease. Important vaccinations will be given. At around 11-16 weeks, close to 50% of the total flock (roughly 12) will be removed from the flock by selling. This would bring some income to the household to cover the cost of feed for the remaining flock and make the flock size manageable. Few cocks will be maintained to produce fertile eggs for future day-old chicken production. Regular follow up and technical back stopping should be carried out by the appropriate experts.

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## IX. Annex (Assessment tools)

### Survey Questionnaire to Evaluate ENGINE Poultry Intervention in Four Regions of Ethiopia

#### Instruction

Start with greetings in local language. Then explain objective of the study *'to identify key factors affecting or enabling sustainability of backyard improved chicken farming by smallholder farmers.* Hence, to address this objective relevant information is being collected from ENGINE target households in selected weredas of Amhara, Oromiya, Tigray and SNNP regions of Ethiopia.

Date \_\_\_\_\_ (DD/MM/YYYY)

Interviewer's name \_\_\_\_\_

Geographic location: Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

#### 1. Demography

1. Respondent's name: \_\_\_\_\_
2. Respondent's relationship to the household head:      1. Household head    2. Spouse  
3. Son/daughter                      4. Other (Specify) \_\_\_\_\_
3. Main job of the respondent (*multiple response is possible*)  
1. Farmer 2. Petty trade 3. Government employee 4. Casual labor 5. Other (Specify) \_\_\_\_\_
4. Sex of the respondent?      1. Male      2. Female
5. Marital status of the owner/respondent? 1. Married 2. Single 3. Widow/widower 4. Divorced
6. Age of the respondent \_\_\_\_\_ (years)
7. Education status of the respondent?      1. Illiterate 2. Read and write 3. Elementary school 4. Secondary School 5. Higher education
8. Household size

Sex	<2 years	2 - 5 years	5 -15 years	15 - 49 year	>49 years
Male					
Female					
Total					

#### II. Adoption of the Technology

9. What type of chicken breed did you receive? 1. Koekoek 2. Lohmann brown 3. ISA brown 4. Bovan Brown 5. White leghorn 6. I do not know
10. Did you have a choice on the chicken type that you received? 1. Yes 2. No
11. Do you know the date you receive the chicken? 1. Yes 2. No
12. If yes for Qn. #11, when did you receive the chicken? \_\_\_\_\_  
(DD/MM/YYYY)
13. Did you know your roles and responsibilities when were targeted for chicken support?  
1. Yes 2. No

14. Was the chicken project you received your priority? 1. Yes 2. No
15. If yes for Qn. # 14, what was the benefit? 1. Consumption 2. Income 3. Employment  
4. Other (specify) \_\_\_\_\_
16. Do you keep chicken you received and/or get hatched from ENGINE chicken?  
1. Yes 2. No
17. If no for Qn. #16, what was the reason for stopping improved chicken? (*Multiple response is possible*): 1. Lack of credit access 2. Lack of supply of the breed 3. Lack of knowledge 4. Lack of extension support 5. Lack of market for my products 6. Disease 7. Other (specify) \_\_\_\_\_
18. If yes for Qn. #16, what is the stock size that you currently have? 1. Cock \_\_\_\_\_ 2. Hen \_\_\_\_\_ 3. Pullet \_\_\_\_\_ 4. Cockerels \_\_\_\_\_ 5. Chick \_\_\_\_\_
19. Did you hatch chicks using local broody hen? 1. Yes 2. No
20. If yes for Qn. # 19, how often did you hatch per year (number of hatching per year):  
\_\_\_\_\_
21. If yes for Qn. # 19, on average how many eggs you put under a broody hen? \_\_\_\_\_ (# of eggs)
22. If yes for Qn. # 19, how many hatched chicks you got? \_\_\_\_\_ (# of chicken you got from eggs you put under a broody hen)
23. If yes for Qn. # 19, what was the purpose of hatching? (multiple response is possible) 1. Sale 2. Own replacement/expansion 3. Other (specify) \_\_\_\_\_
24. If your answer to question # 16 above is no, when did you stop the chicken farming?  
\_\_\_\_\_ (DD/MM/YYYY)
25. On average, after how long the chicken you received from ENGINE start laying egg?  
\_\_\_\_\_ (in months)?
26. On average, for how long the chicken you received from ENGINE laid eggs?  
\_\_\_\_\_ (in months)?
27. How many of your hens were laying eggs a month before you stopped poultry farming?  
\_\_\_\_\_ (# of laying hens)
28. What was (is) the average number of egg(s) you were collecting? \_\_\_\_\_ (# of eggs/week)
29. Have you encountered high death of chicken after you received from ENGINE? 1. Yes 2. No
30. If yes for Qn. # 29, specify the number of chicken: 1. Diseases \_\_\_\_\_ 2. Predator \_\_\_\_\_ 3. Physical damage \_\_\_\_\_ 4. Extreme weather \_\_\_\_\_ 5. Other (specify) \_\_\_\_\_
31. When has the highest death occurred (multiple response is possible)  
1. In the 1<sup>st</sup> week after reception 2. In the first 1 month after reception 3. In the 1<sup>st</sup> 3-6 months after reception 4. In the 1<sup>st</sup> 7-12 months after reception 5. After 12 months of rearing 6. Other (specify) \_\_\_\_\_
32. Was the chicken you received from ENGINE resistant to diseases? 1. Yes 2. No
33. If no for Qn. # 32, please precisely explain your observation \_\_\_\_\_
34. During the ENGINE chicken rearing period, on average how many times your chicken has encountered disease \_\_\_\_\_

35. Was there a time when chicken of your neighbor was healthy but the chicken you received from ENGINE got sick? 1. Yes 2. No
36. Did you know anyone who started chicken production copying/buy chicken or fertile egg from you? 1. Yes 2. No
37. If yes, tell the number of HHs who operates chicken farming by purchasing chicken or fertile egg from you? \_\_\_\_\_

### III. Type of the Package

38. How long is your chicken farming experience? \_\_\_\_\_ (in years)
39. Do you think your environment is suitable for chicken improved chicken raising?  
1. Yes 2. No 3. I don't know
40. If yes for Qn. # 39, please precisely explain why \_\_\_\_\_
41. If no for Qn. # 39, please precisely explain why? \_\_\_\_\_
42. During ENGINE chicken distribution, what was the support along with the improved chicken that you received consisting of? (multiple response is possible) 1. Feed 2. Vaccinated chicken 3. Veterinary service 4. Housing 5. Feeders 6. Drinkers 7. Training 8. Other (specify) \_\_\_\_\_
43. Did you know where to buy feed for your chicken? 1. Yes 2. No
44. Did you know where to buy improved chicken breed? 1. Yes 2. No
45. Did you know where to buy veterinary supplies for your chicken? 1. Yes 2. No
46. Did you know where to buy feed for your chicken? 1. Yes 2. No
47. Did you receive pictorial/tailor made manual for managing the chicken you received from ENGINE? 1. Yes 2. No
48. If yes for Qn. # 47, was it useful to manage your improved chicken farming?  
1. Yes 2. No
49. How far is the nearest veterinary clinic from your house in walking hours? \_\_\_\_\_
50. How far is the office of agriculture extension workers/office of agriculture from your house in walking hours? \_\_\_\_\_
51. How did you manage your chicken? 1. Confined and fed in house 2. Fed the chicken in the house and let them to scavenge in the day 3. Let them to scavenge with no supplementation 4. Other (Specify) \_\_\_\_\_
52. In your view how do you rate the price of inputs? *(for questions you know very well)*
- 52.1 Price Chicken? 1. Very expensive 2. Expensive 3. Moderate 4. Cheap 5. Very Cheap
- 52.2 Feed? 1. Very expensive 2. Expensive 3. Moderate 4. Cheap 5. Very Cheap
- 52.3 Vaccine? 1. Very expensive 2. Expensive 3. Moderate 4. Cheap 5. Very Cheap
- 52.4 Drugs? 1. Very expensive 2. Expensive 3. Moderate 4. Cheap 5. Very Cheap
- 52.5 Chicken house? 1. Very expensive 2. Expensive 3. Moderate 4. Cheap 5. Very Cheap
53. Do you keep records (on egg production, health and income) about your improved chicken farming? 1. Yes 2. No
54. Is it a standard format provided by ENGINE? 1. Yes 2. No
55. Distance from the source of chicken supply to your house; in walking hours? \_\_\_\_\_

56. What was the age of the chicken when you received them from ENGINE project \_\_\_\_\_ (in months)?

## VI. Management

57. What was the source of feed for your chicken after the feed you received from ENGINE finished? (*multiple response is possible*)  
1. Scavenging supplemented with own formulation/purchased 2. Scavenging supplemented with grains 3. Only scavenging 4. Other (specify) \_\_\_\_\_
58. When you were feeding your chicken confined in house, how often did you provide feed for your chicken per day? 1. Once per day 2. Twice per day 3. Three times per day 4. Other (specify) \_\_\_\_\_
59. Did you measure the feed that you provided for your chicken per day? 1. Yes 2. No
60. If yes for Qn. #55, how much feed you offered fed per day? \_\_\_\_\_ (capture the respondents answer in local measuring equipment (e.g. *jug*).
61. Did you prepare laying nest for your hens? 1. Yes 2. No
62. How often did you collect eggs? 1. Once per day 2. Twice per day 3. More than three times in a day 4. Other (specify) \_\_\_\_\_
63. Was there any household member responsibly assigned to manage the chicken?  
1. Yes 2. No
64. If yes for Qn. # 63, who was responsible? 1. Husband 2. Wife 3. Children 4. All together 5. Other (specify) \_\_\_\_\_
65. What was the average time you or your family member spent managing the chicken per day \_\_\_\_\_ (hours)

## VII. Sources of Agricultural Information

66. During rearing your improved chicken, did you receive technical advice from the agriculture extension workers? 1. Yes 2. No
67. If yes for Qn. # 66, how frequently do the agriculture extension workers visit you?  
1. Once in a year 2. Once in a monthly 3. Twice in a week 4. Once in a Week 5. Once in 3 months 6. Other (specify) \_\_\_\_\_
68. If yes for Qn. # 66, in what situation does the agriculture extension worker provided you advice? (*multiple response is possible*) 1. During house construction 2. During input provision 3. During vaccination 4. Whenever disease occurs 5. During credit collection 6. Up on request 7. Other (Specify) \_\_\_\_\_
69. Have you ever received training on improved chicken production? 1. Yes 2. No
70. If yes for Qn. # 69, what were the topics of trainings? 1. General improved chicken management 2. Health 3. Feeds & feeding 4. Financial management 5. Other (specify) \_\_\_\_\_
71. If yes for Qn. # 69, what did you improve in your poultry activity using the knowledge gained from the training? 1. Yes 2. No
72. If no for Qn. # 71, explain why? (*multiple response is possible*) 1. It was short 2. It was hard to understand 3. It lacks hands on exercise 4. Other (specify) \_\_\_\_\_
73. Are you still getting technical support? 1. Yes 2 No

74. What is your source of technical support about chicken production? (*multiple response is possible*) 1. Agricultural Extension workers 2. Fellow farmers 3. Mass media 4. NGOs 5. Agri. Research 6. Other (specify) \_\_\_\_\_
75. On what areas do you want to get technical support? (*multiple response is possible*) 1. Chicken health 2. Chicken feeds 3. Chicken Management 4. Chicken egg/meat consumption 5. Chicken marketing 6. Chicken housing 7. Other (specify) \_\_\_\_\_
76. Are you buying feed from market? 1. Yes 2. No
77. If yes for Qn. # 76, have you ever encountered price fluctuation? 1. Yes 2. No
78. Which month of the year was the price fluctuation critical? \_\_\_\_\_ write name of month(s)
79. Is there critical season for feed shortage? 1. Yes 2. No
80. If yes for Qn. # 79, please specify the name of month(s) \_\_\_\_\_
81. Did you receive training on how to formulate feed from locally available feed ingredients? 1. Yes 2. No
82. Did you receive training on how to hatch chicken using local broody hen? 1. Yes 2. No
83. Do you visit extension agent/agricultural expert? 1. Yes 2. No
84. If yes for Qn. # 83, when do you visit? (*multiple response is possible*) 1. Planning to start chicken farming 2. During input provision (chickens, feed, vaccines, drug, etc.) 3. Any time when there is technical problem 4. Other (specify) \_\_\_\_\_

## X. Biosecurity

85. Did you vaccinate your chicken received through the ENGINE project? 1. Yes 2. No
86. If yes for Qn. # 85, how many times? Please specify \_\_\_\_\_
87. Do you remember the name of the vaccine? 1. Yes 2. No
88. If Yes for Qn. # 87, please name them \_\_\_\_\_
89. Has your chicken been sick and treated? 1. Yes 2. No
90. If yes for Qn. # 89, do you remember the disease? 1. Yes 2. No
91. Who treated your chicken? (*multiple response is possible*) 1. Myself 2. Veterinarian
92. Have you ever treated your chicken using local prepared medicine? 1. Yes 2. No
93. Why did not you take your chicken to the vet clinic rather than treating them using locally prepared medicine (*multiple response is possible*) 1. Medicines were not always available at the vet clinic 2. The medicines were expensive to buy 3. Other (specify) \_\_\_\_\_
94. Is your chicken house separated by fence to avoid entrance of people/animals etc.? 1. Yes 2. No
95. Was there restriction on the number people to enter the chicken house for manage them? 1. Yes 2. No
96. How did you dispose your died chicken? (*multiple response is possible*) 1. Burry 2. Burn 3. Abandon 4. Other (specify) \_\_\_\_\_
97. How did you manage litter from your chicken? 1. Sell 2. Use as manure at the farm land 3. Throw away 4. Other (specify) \_\_\_\_\_

## IX. Consumption

98. Do you consume eggs? 1. Yes 2. No
99. If yes for Qn. #98, how often **per week**? \_\_\_\_\_
100. If yes for Qn. #98, who from among the family member were given priority to eat egg from your chick farm? (*please write in order of importance*) 1. Children under five years' \_\_\_\_\_ 2. Children aged 5 -15 years \_\_\_\_\_ 3. Pregnant women \_\_\_\_\_ 4. Lactating women \_\_\_\_\_ 5. Father \_\_\_\_\_ 6. Other (specify) \_\_\_\_\_
101. Do you consume chicken meat? 1. Yes 2. No
102. If yes for the above question, which one do you prefer to eat? 1. ENGINE provided improved chicken 2. Local 3. Both
103. If you were not eating ENGINE provided chicken meat, what is your reason? Precisely explain \_\_\_\_\_
104. If yes for Qn. #101, how often do you consume chicken meat **per year**? \_\_\_\_\_
105. Who from among the family member were given priority to eat chicken meat from your chick farm? (*Rank in order of importance*) 1. Children under five years \_\_\_\_\_ 2. Children aged 5 -15 years \_\_\_\_\_ 3. Pregnant women \_\_\_\_\_ 4. Lactating women \_\_\_\_\_ 5. Father \_\_\_\_\_ 6. Other (specify) \_\_\_\_\_

## Income

106. What are the chicken and chicken products you sold? 1. Egg 2. Chicks 3. Live hen 4. Live cock 5. Pullet 6. Cockerels 7. I did not sell chicken and chicken products
107. What is the number of eggs sold? \_\_\_\_\_
108. What was the average price of one egg (birr)? \_\_\_\_\_
109. What was the number of chicks sold? \_\_\_\_\_
110. What was the average price of one chick (birr)? \_\_\_\_\_
111. What was the number of hens sold? \_\_\_\_\_
112. What was the average price of one hen (birr)? \_\_\_\_\_
113. What was the number of cocks sold? \_\_\_\_\_
114. What was the average price of one cock (birr)? \_\_\_\_\_
115. What was the number of pullets sold? \_\_\_\_\_
116. What was the average price of one pullet (birr)? \_\_\_\_\_
117. What was the number of cockerels sold? \_\_\_\_\_
118. What was the average price of one cockerel (birr)? \_\_\_\_\_
119. Have you ever given chicken as gift? 1. Yes 2. No
120. If yes for Qn. #114, what were the numbers of chicken given as a gift? \_\_\_\_\_

## VIII. Challenges and Constraints

121. What are the major problems related to improved poultry production? *Rank in order of importance*
1. Feed cost [ ] . Lack of market for farm products [ ]
2. Shortage of veterinary supplies [ ] 6. Disease [ ]
3. Cost of veterinary supplies [ ] 7. Access to extension service [ ]

4. Lack of experience/knowledge [ ] 8. Other (specify) [ ]

**XI. Profitability of the Industry**

122. Did you purchase formulated feed for the chicken you received from ENGINE/get hatched If yes for the above question what the average price per kilogram (Birr) was \_\_\_\_\_

123. If you were buying chicken feed ingredient from the market what was the price per kilogram of; Maze \_\_\_\_\_ oil seed cake \_\_\_\_\_ Wheat \_\_\_\_\_ Wheat barn \_\_\_\_\_ Other (specify) \_\_\_\_\_

124. What did you do with the money you got from the sale of your chicken farm products?  
1. Schools fee 2. Family medication 3. Household consumable 4. Other (specify) \_\_\_\_\_

**General Opinion** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

### Case study out line

Background information                      Date \_\_\_\_\_  
Region \_\_\_\_\_ Woreda \_\_\_\_\_ Kebele \_\_\_\_\_ village \_\_\_\_\_  
Name \_\_\_\_\_ Age \_\_\_\_\_ Sex \_\_\_\_\_  
Education \_\_\_\_\_,  
Marital status; Married \_\_\_\_\_, single \_\_\_\_\_ Divorced \_\_\_\_\_ Widow \_\_\_\_\_  
No. of child: Daughter \_\_\_\_\_ Sons \_\_\_\_\_,  
Social status (any social responsibility) \_\_\_\_\_  
Major means of livelihood (farming, trading, others) \_\_\_\_\_  
Year of experience in the major means of livelihood \_\_\_\_\_  
Participation of family members in household economic activities \_\_\_\_\_  
Number of dependents \_\_\_\_\_

**Discussion of success history;** in the success history those farmers who have joined the ENGINE project and are still operating with verifiable performance success will be included. The respondents must be selected with considerations that their experiences can be shared with and motivate other farmers.

How were you introduced to the project and what kinds of support did you get during your house hold poultry farm activity? Explain.

What were your success full practices and experiences in your ENGINE improved chicken backyard poultry farm management and causes of your success? Explain.

### Observation Check List/Interview Guide for *Hatchers Owners*

Location/District: \_\_\_\_\_, Name of hatchery owners: \_\_\_\_\_

Date of Interview: \_\_\_\_\_

#### **I. Breeder Farm**

1. Stock size
2. Special training on breeder stock management
  - Incubator operation and management
  - Bio security and its effects
  - Training and hatching plan

### Observation Check List/Interview Guide for *Growers*

Location/District: \_\_\_\_\_, Name of growers: \_\_\_\_\_

Date of Interview: \_\_\_\_\_,

1. Stock size
  - Chicken house, Location, Ventilation, Physical structure, Capacity (potential vs actual)
  - Equipment, Brooding facility, Type of feeder, Type of drinker
  - Flock performance (*from the record sheet*), Feed consumption, Egg productivity
2. Health and Biosecurity
  - Health status (*from the record sheet*), Vaccination (*from record sheet*), Disinfection (foot bath at the farm gate and chicken house), Overall, boot, mask, etc.
3. Special training on brooder management

## Focus Group Discussion Guideline

### **General Information**

Location/District: \_\_\_\_\_ Date of Interview: \_\_\_\_\_

1. Attitude of the community towards improved chicken production?
2. Awareness about the chicken package (objectives)
3. Roles and responsibilities of women
4. Importance of the chicken package
5. Control over/decision on income/benefit gained from the chicken package.
6. Why chicken package upscale or replicated beyond the target farmers
7. How was the extension service and technical support related to the chicken package?
8. How was/were the training/s delivered by the project (subject, methods of provision and relevance)
9. Perception of targeted farmers towards protein nutrition (chicken and chicken products). Is there any challenge/constraint in consumption of chicken and chicken products?
10. How do you evaluate ENGINE chicken as compared with the indigenous chicken?  
(Adaptation, behaviour, productivity, benefits (income) etc.)
11. Access to market
12. How were veterinary supplies (vaccine and medicaments are supplied)?

## Key Informant Interview (KII) Guide for Experts

### General Information

Location/District: \_\_\_\_\_ Name of the expert: \_\_\_\_\_

Profession: \_\_\_\_\_ Date of Interview: \_\_\_\_\_

1. Awareness about the project (Please explain about ENGIN Poultry project?)
2. How your office has been managed the project?
3. How were the participant households selected? Criteria and your role?
4. How was the job relationship with project initiators/other partners in due of implementing the project?
5. How the packages were implemented?
6. What were the activities carried out by your office to sustain the project while ENGINE is phase out?
7. Do you think that the targets set by ENGINE are achieved?
8. Was there any intervention related chicken the woreda other than ENGINE?
9. What were components of the packages - type and number chickens, and related inputs?
10. How were participants selected?
11. How was the input source, supply/access system?
12. Technical support system?
13. Who were the stakeholders' organizations and their associated tasks responsible for?
14. What were the approaches followed from planning to implementation of the project?
15. What was the input supply chain adopted?
16. What were the strengths of the project that could be adopted?
17. What were the weaknesses of the project that could be taken as a lesson?
18. Is ENGIN intervention replicated to other households or kebeles?