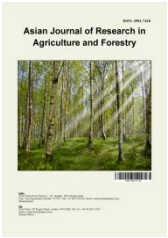

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Pre-extension Popularization of Improved Dual Purpose Koekoek Chickens in Tahtay Maichew District Central Zone of Tigray, Ethiopia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Central zone of Tigray has potential and poultry stock. However, the productivity in terms of egg and meat is low since the majority of household depends on local chickens and rearing of their chickens through a traditional production practices. Then, the objectives of the pre-extension popularization of Koekoek breed was i) to popularize and evaluate the production performance the Koekoek breed chickens in the small holder Farmers and ii) To analyze farmers feedback towards this improved Koekoek chickens breed at smallholder farmers' management. T/maichew District, My-sie kebelle was selected based on the project financial support of Irish Aid Operational Research (OR) purposely. A total of 17 household heads willingly participated to adopt the

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Koekoek breeds. Data record sheet and semi-structured questionnaires were prepared to collect the required data. Then, using simple descriptive and Likert measurement level used to achieve result. The finding of the research shows that an annual average yield was found to be 204 eggs per year/ chicken. Similarly, the respondents agreed on that the chickens have well adapted, good growing ability, relatively resistance to diseases, have good scavenging ability, and productivity as well have medium eggs size and good egg and meat tasty of Koekoek chickens. The improved chickens' breed (Koekoek) is better to be transferred to other mandate areas of Axum Agricultural Research Center. In addition, collaboration of stakeholders needs to be strengthening so that large scale demonstration community production system is going to be functional. Strengthen the human resource and institutional innovations are important point for dissemination of the improved poultry breeds to all beneficiaries of small holder farmers.

Keywords: Popularization; improved chicken; koekoek; and smallholder.

1. INTRODUCTION

Poultry production is considered as an integral part of livestock production system which plays an important socio-economic role in developing countries [1,2]. Raising income and urbanization in many parts of the developing world caused a growing demand for animal products. The poultry sector has the potential to provide relatively cheap animal protein to the population and improve nutritional status, create employment for both rural and urban and generate income in time of economic difficulty. Village poultry is the first step on the ladder for poor households to climb out of poverty [3].

In Ethiopia, chicken production system is both traditional and modern production system in which most widespread and almost every rural family owns chicken, which provide valuable sources of family protein and income [4]. The total chicken population in the country is estimated to be 59.5 million and the breed composition indicated that 54.06, 2.6 and 2.8 million are indigenous, exotic and hybrid chickens, respectively which are mainly kept by small holder farmers in scavenging environments and most of (88.5%) the poultry products obtained from the conventional family poultry production system [4]. According to Mehari [5] revealed that, feed resource for rural poultry is obtained by scavenging in and around the homesteads and consists of household wastes, anything edible found in the immediate environment, together with a small amount of grain supplements provided by the household. Similarly, the potential supplementary feed resources used by small holders' poultry producers are maize grain, household scraps, cereal debris and wheat [6]. However, majority of local chickens are kept in an extensive production system which characterized by low productive performance, late age of sexual maturity because of their poor genetic potential in Ethiopia [7]. Additionally, due to the varying the production and reproduction system and infrastructure challenges, the poultry sector's economic contribution is not proportional to the huge chicken population in the country [8].

In Ethiopia, genetic improvement programs of chickens commenced since 1952 that used to focus on improving temperate breeds to improve productivity and different breeds of improved breeds like egg and dual purpose and crossing the temperate breeds with indigenous chickens [9]. As a result, an evaluation on the reproductive performance of 62.5% blood level crosses (local * white leg horn) at Debre zeit Agricultural Research Center (DZARC) showed that the highest egg production performance cross bred than the pure white leghorn and indigenous chickens [10]. In this regard, Axum Agricultural Research Center under the Tigray Agricultural research Institute (TARI) has been done different research on the areas of poultry productivity improvement to improve the poultry production system of smallholder producers in his mandate areas and taking the mission on excellence of poultry research in the region among the research centers. Thus, this study designed to popularize and evaluate the improved dual purpose Koekoek chickens on their reproductive performance in smallholder farmers and to analyze the perceptions towards the breeds.

2. MATERIALS AND METHODOLOGY

2.1 Study Area

This study was conducted in Tahtay Maychew district rural administration of the Central Zone of Tigray regional state, northern part of Ethiopia. The district is located in a geographic location of

$38^0$32' and $14^0$07'E, and $13^0$15' and $14^0$39'N and altitude of 1500-2260 meter above sea level. It is located 262 kilo meter away of the capital city of Region Mekelle to the shire-Endaslassie route. The annual rainfall of the district received 850.5mm that is mono modal type of rainfall concentrated July to August with relative an annual temperature of 20^0c. The agro ecology of the district is tepid to cool sub moist mid-highlands SM_2 5D-2, 70% mid-land ''Weina-dega'' and hot to warm sub moist lowlands or SM14D 30% ''Kola'' [11]. The study area has a good climatic condition and compatible for growing crop and livestock husbandry. The majority of crops grown in the area are Teff (epidemic to Ethiopians), Sorghum, Maize, Finger Millet and other horticultural crops whereas the dominant livestock species such as cattle, shoats, Chickens, Beehives and equines.

2.2 Sample Size and Technique

2.2.1 Sample size and technique

The study was done in Tahitay Maychew District namely; Mysie Peasant Association (PA), selected purposively in the willingness of IRISH AID Operational Research (OR) project targeted watershed intervention area. Beneficiaries were also selected on their willingness to participate and adopt the dual purpose chicken breeds. The study was conducted on 17 farmers, and they were prepared chicken traditional houses and metal cage. Koekoek chickens are improved breeds which are dual purpose of semi scavengers and reared for both egg and meat production. This breed are semi scavenging and dominantly black and spotted white color feather helps to escape from predators easily fit to rural poultry keepers and easily reared for low income generating farmers especially compared to other non-scavenging improved breeds. For each participant distributed unsexed 45 days old chickens. A total of 20-25 Koekoek chickens were given for each participant after taking the training and prepared their house as well as feed.

2.3 Capacity Building

The farmers and DAs had trained and informed about the improved dual purpose improved chickens as well as recommended a management wise. Training was delivered to the farmers and DA to building their knowledge and skills on all poultry management practices (housing, feeding and watering, health conditions). The Chickens management carried out by the farmers whereas technical support and close follow up done by researchers. In recent years, participatory research has become increasingly relevant in public agricultural research. The degree to which a technology dissemination process is participatory and ensures the participation of all stakeholders, especially the poorest members of society, are frequently used to assess its effectiveness [12].

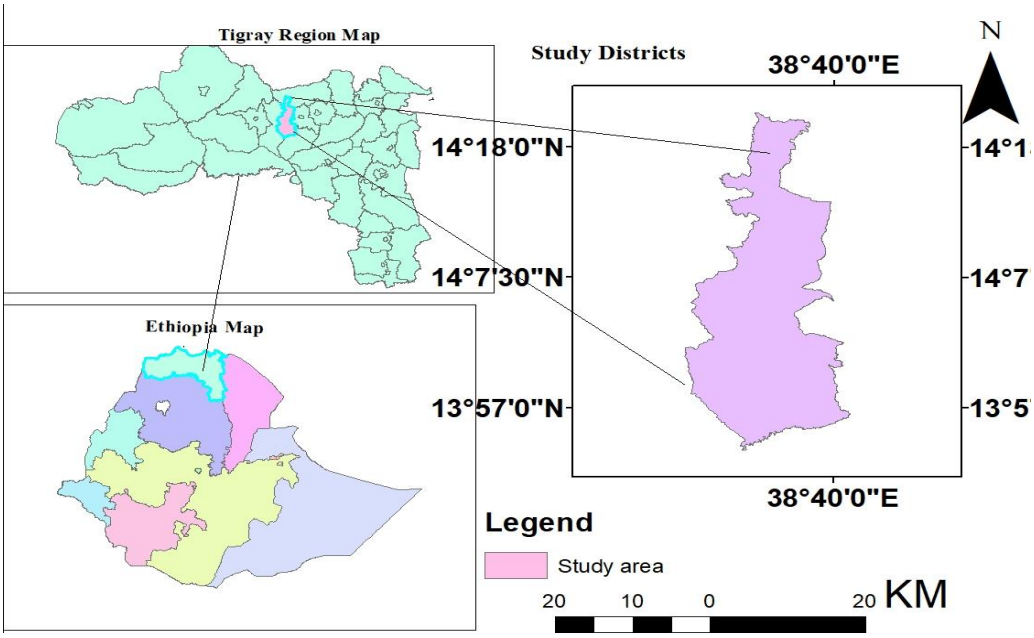

Fig. 1. Map showing study location

2.4 Data Collection

Data were collected using recording sheet and semi-structured questionnaires. Beginning from the housing to all technical information (housing, feed type, yield and perception attributes) data were collected by prepared semi-structured questionnaires. Additionally, the eggs were collected using prepared recording sheet which was kept by the participants for recording the daily egg yield. Recording sheet format had chicken age, number of layers, egg laid daily. Totally, the data were collected for consecutive 20 weeks were the chickens started laying egg to maximum laid period. The farmers had maintained an average of 8 egg layers during data collection period. Rensis Likert was developed and used to collect respondents' attitudes and opinions towards a product or parameters/items in the form of different agreement and disagreement levels of measurements. Accordingly, the data were collected through prepared five Likert measurement scale method.

2.5 Statistical Analysis

The data were collected and analyzed using methods of descriptive statistical methods (mean, minimum, maximum and standard deviation) and five scales Likert scale analysis using tools of SPSS. The Likert scales assigned from 1-5, namely strongly Disagree up to Strongly Agree used to analyzed the data. Simple descriptive statistics for the egg mean yield and mean score of agreement level and percentage for frequency perception measurement attribute parameters.

3. RESULTS AND DISCUSSION

3.1 Yield Estimation

The descriptive analysis result in (Table 1) indicated that the performance of Koekoek chicken under the farmers' management was found 204 eggs /year /hen. The result agreed with finding and reported by Elias Gonta [13] that the performance production of Koekoek chicken breed gave average mean of egg of 145 per year per hen in famers' management. Similarly, [7] reported that the performance of the Koekoek breeds exceed than the local egg production performance and egg yield of local chickens 30-60 /year/hen compared the improved /exotic breeds gave an egg of 135 -180/year /hen. The management for their chickens among farmers makes a difference on the performance of these chickens as shown from the result. The maximum and minimum laid egg ranges from 104 up to 204 which shown almost 100% yield difference among the farmers. This could be due to the feed supplement in quantity and quality. The feed might have low quality to provide the required notorious requirements compared to concentrated feed. No matter the system of production and geographical location the availably, quality and feed price of ingredients among the major constraints of poultry production. The main constraints on chicken production are poor nutrition and health problems. Poultry production is similarly inhibited by reduced contact with goods, markets, and services, poor institution commitment, and absence of skills knowledge as reported by Ahiwe et al. [14].

The farmers were supplied a feed of like maize, sorghum and cereal bran without any processing since there is no processing facility in the study area (rural). The farmers were allowed partially but not fully released as the local breeds to scavenge their chickens (see Fig. 2). A research report revealed by Elias Gonta [15,16] maize, sorghum and sunflower the main feed supplements by poultry keepers and composed of a mixture various crops [17] that showed 95% of chicken keepers provided their products without any processing [18].

3.2 Perception of Farmers

The descriptive analysis of perception parameters are presented in (Table 2). The analyzed result finding showed that the majority (69%) of the sampled respondents agreed and positive perception on the prepared positive attributed sentences. The popularized dual purpose (meat and egg) chickens have accepted on well adapted to the farmers' management, growing ability and diseases resistant. In other hands, this improved chickens poor in escaping from dangerous or predators, high in taking feed and less attractive in color by consumers especially in the market compared to the local breeds of red color preferred by consumers due to different cultural perceptions with mean score of 3.44 (68.8%). The respondents appreciated and agreed on the breeds have ability in scavenging additional feeds, gives good egg productivity on the farmers' management fitted. This is compatible a report revealed by Abadi et al. [19] the perception of famers showed that farmers response to the breed promised in terms of age to laying egg and egg market price but less preferred to their market price compared to the local breeds [20].

Fig. 2. Physical performance of Koekoek chickens under the farmers' management

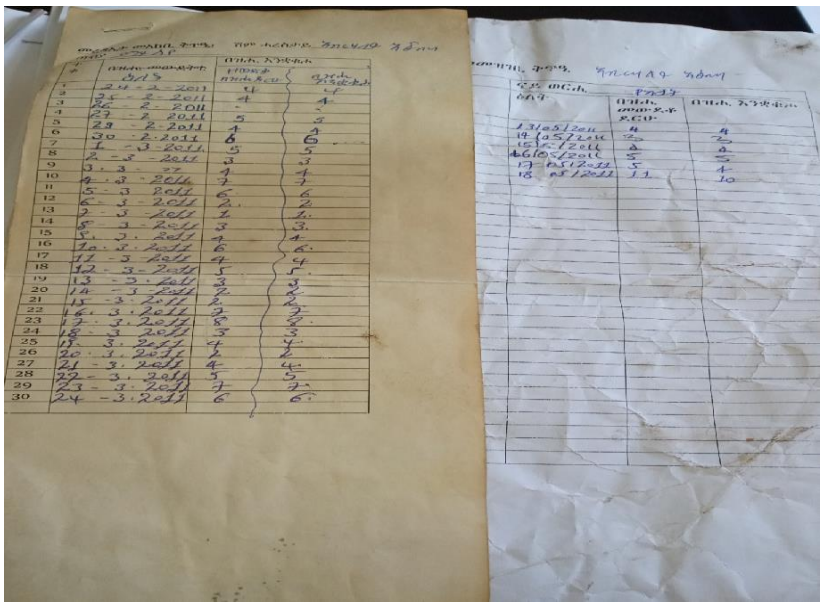

Fig. 3. Recording sheet (2011 Ethio calendar) for daily egg layers chickens in each participant farmers

Table 1. Average distributed, survived and performance of Koekoek chickens (egg yield /hen/year)

Distributed	Survived	Respondents (n=17)		
		Min	Max	Mean ±SD
25	22	104	292	204 ± 67

The response of the respondents agreed on the medium eggs size and good egg and meat tasty of Koekoek chickens. Generally, rearing and production of improved Koekoek chickens have to enhance the income farmers for food security of smallholder farmers which is poultry is the first step on the ladder for poor households to climb out of poverty.

Table 2. Participant farmers' feedback on the dual purpose Koekoek chicken and their attribute parameters

Positive attribute sentences	Perception Level (n=17)					Mean	SD
	SA	Agree	No -change	Dis-Ag	SD-Ag		
Koekoek breeds well adapted to farmers management		11(64.70)	3 (17.65)	2 (11.76)		3.5	0.71
Koekoek breeds have good growing ability	6 (35.3)	11 (64.70)				4.35	0.49
Koekoek breeds have disease resistant	2 (11.76)	9 (52.94)	6 (35.3)			4.06	1.4
Koekoek breeds less exposed to danger		14 (82.35)		3 (17.65)		3.65	0.78
Koekoek breeds escaped easily from predators		5 (29.41)	2 (11.76)	10 (58.82)		2.71	0.92
Koekoek breeds less consumed feed		2 (11.76)		8 (47.06)	7 (41.17)	1.88	0.93
Koekoek breeds good attractive in color		5 (29.41)		11(64.71)	1 (5.88)	2.53	1.01
Koekoek breeds have good scavenging habit		14 (82.35)	2 (11.76)	1 (5.88)		3.71	0.77
Koekoek breeds gives high yield		15 (88.24)	2 (11.76)			3.88	0.33
Koekoek breeds give having good egg size		9(52.94)	8 (47.06)			3.53	0.51
Koekoek breeds' egg are demanded by consumer		11 (100)				4.00	0.00
Koekoek breeds' meat is tasty		11 (64.71)	5 (29.41)	1 (5.88)		3.5	0.93
Mean weight						3.44	0.68

Note: SA= Strongly Agree (5), A= Agree (4), NC= No change (3), DA= Dis agree (2) and SD= strongly disagree (1)

4. CONCLUSIONS AND RECOMMENDATION

The pre-extension popularization of improved Koekoek in the smallholder farmers' management for dual purpose (egg and meat) has shown a good result. Farmers' provide locally available feed resources but not enough as the recommended package observed during the study. Generally, from the improved chickens with an annual average yield of egg per chicken was found 204 eggs which are promised result. Similarly, the respondents agreed on that the chickens have well adapted, good growing ability, relatively resistance to diseases, have good scavenging ability, and productivity as well have medium eggs size and good egg and meat tasty of Koekoek chickens. Similarly, the respondents said that the chickens have poor escaping ability from predators, consumed more feed and less attractive in color compared to their local breeds. Generally, raring and production of improved Koekoek chickens have to enhance the income farmers for food security of smallholder farmers. The improved chickens' breed (*Koekoek*) is better to be scale out to other similar small holder farmers poultry keepers. In addition, collaboration of stakeholders needs to be strengthening so that large scale demonstration community production system is going to be functional. Strengthen the human resource and institutional innovations are important point for dissemination of the improved varieties to all beneficiaries of the rural poultry keepers.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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