

Research Article

Popularization of Dual Purpose Poultry Technology Package (Potchefstrom Koekoek Breed of Chicken) in Jimma Zone

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Abstract

Modern poultry production started in Ethiopia in colleges and research stations and mainly focused on the introduction of exotic breeds to the country and the distribution of these breeds to farmers, including management, feeding, housing and health care packages. Accordingly, the popularization of dual purpose poultry technology package (Potchefstrom koekoek chicken breed) was conducted in Omonada and seka chekorsa woredas of Jimma zone in Oromia national regional state under four kebeles in 14 household farmers. The overall objective of the study was to promote poultry production technologies as additional household income with specific targets of enhancing a small scale commercial poultry production packages and promoting the contribution of poultry technologies as household income source and food security. Sites were selected basically by their potential and willingness to construct poultry house and to perform the technology as per recommendation. Training was given for 28 (14 men and 14 women) farmers, 7 developmental agents and experts. Necessary data was recorded from the sites by using checklist and household interview. According to collected data analysis average body weights of chickens in the 20 weeks of age are 1.23kg with average male and female weight of 1.47Kg and 0.99Kg respectively. Survival rate of chicken up to 16th week is 89.14% which is better than the studies conducted in Jimma zone before on the same breed. Field day was arranged to popularize for other farmers after start to laying egg. Accordingly, 121 (94 male and 27 female) farmers and 10 (9 male and 1 female) experts and governmental officials from woreda to kebele were participated. Awareness was created through experience sharing between participant farmers on the technology during field day. Generally, the result obtained from present study shows Koekoek Potchefstroom chicken breed show better performance in both weredas for their survival, egg and meat production at farmers' management condition and it has got high acceptance among farmers due to adaptable characteristics, disease resistance and ability to use them for both quality egg and meat. However, feed unavailability and its' high price is great challenge for poultry production which is followed by disease. Therefore, concerning bodies such governmental and NGO should have to intervene to solve the problems.

Keywords

Popularization, Potchefstroom Koekoek, Packages

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1. Introduction

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country [5]. Livestock also plays an important role in providing export commodities, such as live animals, hides, and skins to earn foreign exchanges to the country [4]; and also Livestock production systems are considered to be a subset of farming systems [12]. Livestock production includes livestock cattle, sheep, goats, draught animals (horses, mules, donkeys and camels), poultry and beehives (Ibid).

Under livestock production poultry is the major sector which is common in both rural and urban area even though its amount vary from rural to urban. Poultry production is the most suitable technology that is practiced in every rural and peri-urban parts of Ethiopia which requires a small land and capital for investing [13, 14]. Modern poultry production started in Ethiopia about 30 years ago, mainly in colleges and research stations. The activities of these institutions mainly focused on the introduction of exotic breeds to the country and the distribution of these breeds to farmers, including management, feeding, housing and health care packages [3].

Poultry includes all domestic birds kept for the purpose of human food production (meat and eggs) such as chickens, turkeys, ducks, geese, ostrich, guinea fowl, doves and pigeons. Additionally in Ethiopia the total poultry population at country level is estimated to be about 56.06 million which includes cocks, cockerels, pullets, laying hens, non-laying hens and chicks [5].

Poultry, especially in the small scale scavenging village context, can make considerable contributions to poverty alleviation and in the supply of high quality protein. They have a high reproduction rate per unit time, are efficient in transforming otherwise largely unusable protein and energy into human food and require very little capital investment. They are kept by all strata of society from the landless rural poor to the well off in the cities. Eggs and poultry meat are more readily available than many other animal products and the small unit size does not require them to be stored or preserved [10].

The Potchefstroom Koekoek was breed at the Potchefstroom Agricultural College during the 1950s by a researcher named Marais. This breed is a composite of the White Leghorn, Black Australorp and Bared Plymouth Rock. It was developed for the following specific production traits: the hens should lay a brown shelled egg with an average weight of 55.7 g and the carcass should be attractive with a deep yellow coloured skin and it served as dual purpose breed (for egg and meat) in South Africa and neighboring countries [7, 14].

Poultry production is advantageous for women and children to handling and managing easily. In many country poultry

are regard as women business [1]. In rural areas poultry production used to empower less resource asset farmers and also widowed or divorced women to cover different costs like medical expenses, for entertainment, for buy shoes and dress, transport, and use the product for home consumption to reduce additional value.

Rural poultry provide animal protein in form of meat and eggs [1] also eating poultry meat and eggs is especially important for children and expectant mothers. High Significant contribution in areas child malnutrition is common. Enhanced nutrition, improve growth, mental development, school performance and labor productivity [1]. As well as being valued in the religious and cultural life of society in general and the rural people in particular.

Merits in poultry productions are to control pest and insect, generate continuous income, empower less resource and poor farmers (like there is no land and asset), used for home consumption to providing high nutrient (meat and egg), promoting gender equality, it is not require much more capital to start can be start with less amount of capital, does not need a lot available space and area, also get immediate result when compare with other farming activity.

This kind of production does not gain much more emphasis from governmental and non-governmental organization relate with its advantage. According to [6] this low input poultry does not receive due attention from many agricultural policy makers (including livestock specialists).

2. Objectives

2.1. General Objective

Overall objective of the study is to promote poultry production technologies as additional household income.

2.2. Specific Objectives

- 1) To enhance a small scale commercial poultry production packages.
- 2) To promote the contribution of poultry technologies as household income source and food security.

3. Materials and Methods

3.1. Description of the Study Area

The study was conducted in Omonada and Seka chorsa woreda from Jimma zone of Oromia national regional state. Omonada is a part of Jimma zone which is located at a distance of 290 km from Addis Ababa and 72 km from Jimma town. It is bordered on south by Gojeb river which separates it from the southern nation nationalities and people region

(SNNPR), on the west by Dedo, on the north by Nedhi gibe, on the North west by Kersa wereda and on the east by the Omo river which separates it from the south nation nationalities and people region (SNNP). Its altitude ranges from 1000m.a.s to 3340m.a.s. The rainfall of the area is bimodal with unpredictable short rains from March to April and main season ranging over June to September and annual rainfall ranges from 1066-1200mm. It has 20 rural and 3 urban kebeles with total population of 254,417.

Seka chekorsa is another study area from twenty woredas of Jimma zone which is found at 355 km distance from Addis abeba and 18km from Jimma town. It is bordered with south by Shebe sombo wereda; on the North West by Gomma; on west by Gera and on the north by Mana and on the east by Dedo. It has 34 rural and 2 urban kebeles and total population of 258,100 (9,138 urban and 248,962 rural). From the total rural population of 124,166 (49.87%) are female and 124,796 (50.13%) are male. Altitude of Seka wereda ranges from 1580 to 2560 meter above sea level with mean annual rainfall, ranging between 1,200 and 2,800mm.

Coffee is the major cash crop for Seka chekorsa and other cereal crops are crops that the farmers used for home consumption where as in Omo nada wereda cereal crops are used as a cash crop and crops for home consumption. Additionally, Khat, peppers, fruits and Teff are grown in both districts.

3.2. Participant Household Selection

The farmers were selected purposively based on their interest and willingness to perform the technologies as per recommendation. In addition to this, their potential to construct poultry house other necessary things that could contribute to the productivity of enterprise was other criteria. Accordingly 14 (8 women and 6 men) were selected for demonstration.

3.3. Research Procedure

The study was conducted by selecting those household who can provide poultry house, based on their interest and commitment to manage the chicken. For each farmer day-old 50 up to 100 chicken's broods were distributed and they are made hay box. Hay box is a box that prevents chickens from insects, Wind, rat, ants during day and night. The model of the hay-box was for day time 127*30 and 50*30 for night. Vaccination was provided within recommended ways and days.

3.4. Data Collected

To achieve the objectives set above different data was recorded from the sites; such as, the amount of feed offered at different phase, body weight at different age level, Average egg production/hen/year; Type of vaccines administered; way and/or route of administration; Cause of mortality (disease, predator, mechanical culling etc.). Additionally, cost

of production (vaccine, feed, etc.); Income from sale of cocks, nonproductive/spent hens and eggs; The amount of egg and number chicken used for home consumption/gift and its calculated market price during the time; Participant households perception before and after the package demonstration; number of farmers participating on the field days and training.

3.5. Method of Data Collection

Different methods of data collection were employed such as Household interview, focus group discussion and observation.

3.6. Data Analysis

The data which was collected by the planned methods was analyzed by simple descriptive statistics such as frequency, mean, percentage and partial budget analysis by using excels and SPSS software.

4. Result and Discussion

4.1. Socio Economic Characteristics of Beneficiaries

Table 1. Socio economic characteristics of beneficiaries (host farmers).

	Freq.	Percent
Sex of host farmers		
Female	8	57.14
Male	6	42.86
Total	14	
Sex of household head		
Female	1	7.14
Male	13	92.86
Education level Household head		
Uneducated	5	35.71
Primary school completed	2	14.29
Secondary school completed	6	42.86
Diploma and above	1	7.14
Marital status		
Married	11	78.57
Single	3	21.43

As shown above in table 1 both women and men were di-

rect beneficiaries of this technology. Accordingly, 57.14% are women and 42% are men. On the other hand from the total beneficiaries 92.86% are men headed household and the rest 7.14% are women headed household. This indicates that most of beneficiaries of this technology were women and youth as although the proportion of women is much greater than youth; i.e., 78.57% of them are married and 21.43% are singles. Their household head have many contributions on their work starting from house construction for successful

implementation.

Education level of household head is presented in [table 1](#) and the results showed that majority of them (42.86%) are secondary education completed which is followed by uneducated (35.71%). This shows that if they have trained and have necessary support every person can engage in poultry and be successful even though the amount of success cannot be equal.



Figure 1. Chicken performance at farmers' condition starting from day old chicken (DOC).

4.2. Mortality Rate

The survival rate of chicken varies from farmer to farmer due to management difference. As shown below in [Table 2](#) survival rate of chicken in the first 8 weeks is 91.36% and mortality rate is 8.64%. On the other hand, mortality became decreasing in the second 8 weeks which is 2.21% and survival rate rises up to 97.79% on average. It shows mortality rate of chicken become decreasing as they become growing. Hence, the total death or mortality rate recorded until 16

weeks is 10.86% i.e., its survival rate is 89.14%. The result of this study is nearly the same with the result of [\[2, 9\]](#) on the same breed at Areka which has shown that on average 93.1% of chicken survived to laying age. On the other hand the result of this study is better than the study result carried in Jimma on the same breed which is the survival rate of Koekoek was 53.5% at farmer management condition. The causes for those deaths were predator and to some extent diseases and some of them had stolen by theft. There was also good lesson that two farmers manage provided birds by 100% successful survival rate until 16th weeks.

Table 2. Survival rate of poultry chicken in the first and second eight weeks.

Participant	No of chicken given	Mortality recorded		Total mortality
		During the first 8 week	During the second 8 week	
HH1	100	6	3	9
HH2	100	16	2	18
HH3	100	6	3	9
HH4	100	26	2	28
HH5	50	3	0	3
HH6	100	20	3	23
HH7	50	7	2	9

Participant	No of chicken given	Mortality recorded		Total mortality
		During the first 8 week	During the second 8 week	
HH8	50	8	2	10
HH9	100	6	5	11
HH10	50	0	0	0
HH11	50	5	3	8
HH12	50	5	4	9
HH13	50	13	2	15
HH14	50	0	0	0
Average	71.43	8.64	2.21	10.86

4.3. Body Weight of Chicken

Average body weights of chickens in the 20 weeks of age are 1.23kg with average male and female weight of 1.47 and 0.99 Kg (Table 3). A study by [9] in Arbaminch reported body weight of 1.62 kg and 1.09kg male and female chicken respectively at 20th weeks. Similarly, the result of study by [2] at Areka town in wolaita zone and Jimma zone by [8] reported that the body weight of male and female chicken of the same breed is nearly the same which is 1.5 kg and 1.1 kg respectively at 20th weeks.

Other study conducted by [4] at on station feeding trial at Haramaya University also reported that average body weight was 1.39 kg at 19th weeks of age for Koekoek breed. In general body weight of koekoek breed achieved in our case indicated there is good potential in the study areas.

Table 3. Body weight of chicken in 20 days of age.

Participant	Average body weight (kg)	
	Male	Female
HH1	1.23	0.9
HH2	1.6	0.8
HH3	1.5	0.85
HH4	1.3	1
HH5	1.6	1
HH6	1	0.25
HH7	1.5	1
HH8	1.38	0.88
HH9	1.7	1.05

Participant	Average body weight (kg)	
	Male	Female
HH10	2	1.5
HH11	1.5	1.25
HH12	1.5	1.25
HH13	1.3	1
HH14	1.5	1.06
Average	1.472	0.985

4.4. Average Egg Production per Year

The average amount of egg obtained from one hen per year is varying from one farmer to another based on the feed management. The amount and type of feed they provided for determine the chicken productivity. According to this the maximum number of egg obtained from one hen was 192 eggs and minimum was 30. Some of the farmers are not feed appropriate feed for laying chickens so that they completely changed to meat chicken.

Table 4. Average egg production per hen/year.

Farmers ID	Average egg production
HH2	192
HH4	30
HH5	114
HH6	50
HH7	100
HH8	100

Farmers ID	Average egg production
HH9	176
HH10	152
HH11	66
HH12	60
HH13	90
HH14	138

It shifted from dual purpose to one purpose because their body becomes too heavy due to inappropriate feeding. On the other hands shortages of feed lead some of chickens not to lay egg.

4.5. Training Provided for Technology Users

Training were provided for farmers, developmental agents 'and experts of respective woredas on poultry management, providing of feeding system, recording of data, disease control and prevent. Accordingly twenty eight (28) farmers, seven (7) developmental agents and experts were attended training (Table 5).

Table 5. Training provided for host farmers.

Trainee	M	F	Total
Number of farmer	14	14	28
Number of DAs and woreda expert	6	1	7
Total	20	15	35

4.6. Field Day and Feedback from Participant

Field days were organized in seka and Omo nada wereda to popularize the technology and share experience for other farmers. On the field day event 54 men and 91 women were participated and share experience from the farmers benefited from demonstration (Table 6).

During field day event intensive discussion was held between participants on the technology. On the discussion the farmers recognize the difference of Potchefstroom koekoek chicken breed from other local breed interms of productivity by saying they are very productive as compared to local breed if they have balanced feed which contain necessary nutrient for egg laying female chicken.

Table 6. Field day participants.

			Seka	Omo Nada	Total
Participants	Farmers	Male	30	64	94
		Female	12	15	27
		Total	42	79	121
	Experts and DAs	Male	4	5	9
		Female	1	0	1
		Total	5	5	10
	Researchers	Male	4	4	8
		Female	3	3	6
		Total	7	7	14
	Total participants		54	91	145

In contrast to this fact, the participants were raised the feed constraint such as feed shortage and high price of feed which inhibits low income family not to engage in poultry production.

4.7. Experience and Attitude of Farmers Towards the Technology

It was difficult to convince farmers to use Koekoek

Potchefstroom breed in the beginning because there was misunderstanding of breed characteristics such as they cannot survive as much as local; they cannot graze etc. Most farmers were scared of day-old chicken are sensitive and easily affected, hard to adopt environmentally harsh condition and outbreak of disease. After starting the work the attitude of farmers towards breed as well as day old chicken management was improved and they confess it is not that much difficult to engage in poultry production unless the

inputs of production are available. Experience is considered as one determinant in which the farmers who have experience before agreed to engage in to the work within short period of time better than non-experienced. Majority of beneficiaries (57.14%) farmers have no experience and only 42.86% of them have experience on poultry production (Table 7). Most of experienced farmers also have experience only on local breed.

Table 7. Experience of famers on poultry production.

Have experience on poultry production	Freq.	Percent
No	8	57.14
Yes	6	42.86
Total	14	100.00

There was misunderstanding and negative attitude towards improved chicken breed before. Table 8 below showed perception of the farmers after demonstration. Majority of the farmers (50%) who are benefited from demonstration agreed

on the idea of laying eggs earlier than local breed whereas 35.71% of them disagree on the idea. Similarly, 71.43% of farmers agreed on its better productivity as compared to local breed. Another thing here is the time period in which chicken reach for meat, quality of meat good and marketable size & color of egg and on these 64.29%, 78.57% and 64.29% of the farmers benefited from demonstration were agreed. This shows that the perception and attitude of farmers improved due to awareness creation through practical work and theoretical trainings.

Awareness of the farmers on importance of dual purpose poultry technologies was improved as source of additional income for a family member, easily ensure food security and start with low capital. It is easy to aggregate with other kind of jobs.

Finally, all farmers are highly satisfied by breed interms of egg and meat production. They used it for both as income source through selling of eggs, cock and non-productive /spent hens and home consumption which helps to prevent malnutrition in particular household. Generally, their attitude towards poultry technologies was changed. The technology was transferred and popularize successfully and also positive attitude towards chicken breed (koekoek) is developed after demonstration.

Table 8. Attitude of farmers after demonstration.

	Disagree		Neutral		Agree	
	N	%	N	%	N	%
They start laying eggs earlier than local breed	5	35.71	2	14.29	7	50
Their productivity is better than local breed (egg/hen/year)	0	-	4	28.57	10	71.43
They reach for meat in short time	2	14.29	3	21.43	9	64.29
Its meat quality is very good	0	-	3	21.43	11	78.57
Its egg has marketable size and color	0	-	5	35.71	9	64.29

4.8. Economic Benefits

Economic advantage was different from farmers to farmers based on their management and feeding. Farmers constructed house for chicken and full package of technology with starter feed was provided for them. The maximum price of one cock was 400 ETB and minimum was 100 ETB. Cocks were sold due to different reason before grown and this affect the profit that would the farmers got. Accordingly they obtained 4984.64 birr on average and 9110 birr get from sales of cock in individual farmer household level.

4.9. Challenges and Constraint of Poultry Production

Present study shows there are a number of challenges for poultry production in the study areas; such as feed shortage, predator and diseases. Similar finding reported by [11] indicated that feed shortage, disease, predator and poor housing condition as big challenge of poultry production in Lemo district of Hadiya zone.

5. Conclusion

From the findings of the result it can be concluded that

Koekoek Potchefstroom poultry breed show better performance in both worded for their survival, egg and meat production at farmers' management condition. Thus, this breed is survival at midland agro ecological condition. It has got high acceptance among farmers due to adaptable characteristics, disease resistance and ability to use them for both quality egg and meat. Despite this, feed unavailability and its' high price is great challenge for poultry production which is followed by disease. Therefore, concerning bodies should have to intervene to solve these problems. Frequent training on house construction and feed formulation by using locally available materials as well as controlling the price of feed is necessary to overcome the challenges of poultry production.

Abbreviations

SNNPR	Southern Nations Nationalities Peoples Region
FAO	Food and Agriculture Organizations
CSA	Central Statistical Authority
DOC	Day Old Chicken
SPSS	Statistical Package for Social Science Software

Author Contributions

Mathewos Mebrate: Conceptualization, Formal Analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Mekdes Shiferaw: Conceptualization, Data curation, Investigation, Writing – original draft

Worku Demissie: Validation, Writing – original draft

Mohammed Assen: Conceptualization, Investigation, Supervision

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Conflicts of Interest

The authors declare no conflicts of interest.

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