



# Demonstration of Maize and Niger Seed Cake Supplementation on Egg Production Performance of Local Scavenging Hens in Selected Districts of Western Amhara, Ethiopia

Fisseha Moges<sup>1</sup>, Mohammed Nega<sup>2</sup>, Getnet Zeleke<sup>3</sup>

<sup>1</sup>Bahir Dar University, College of Agriculture and Environmental Sciences, P.O.Box 5501, Bahir Dar, Ethiopia.

<sup>2</sup>Andassa Livestock Research Center, P.O.Box 27, Bahir Dar, Ethiopia.

<sup>3</sup>Amhara Region Agricultural Research Institute, Ethiopia.

\*Corresponding author's email: fismog2@yahoo.com

## ABSTRACT

A demonstration trial was conducted on four selected chicken eco-types found in three districts (Guagusa Shekudad, Mecha and Farta) of Western Amhara, Ethiopia. The trial was done on 80 village chicken owner households using a total of 344 local hens. It was done for two successive years (2011 and 2012). The major objective of the study was to evaluate the egg production performance of local hens with strategic feed supplementation. Correspondingly a formal survey was conducted on 320 local hens being reared in similar villages to identify their egg production potential under the existing farmers' management condition. The supplementary diet was prepared using maize, noug cake and salt. Each hen was given 60 grams of supplementary feed daily. The average number of local hens used in supplementary feeding trial per each household was 4.3 hens. The average egg production of local hens under existing farmers' management condition was found to be 51.6 eggs/hen/year. The average number of eggs laid per supplemented hens per day was 0.29 eggs. The total egg production of supplemented hens was 50.88 eggs/hen/six months period. The economic analysis result indicated that village chicken producers could get additional cash income of \$ 9.6 Ethiopian Birr and \$ 16.9 Ethiopian Birr, through selling of extra produced eggs at local markets and urban markets, respectively. The result of the study indicated that 97.5% of participants were happy with the feed supplementation regime. Poor palatability of noug cake due to improper mixing was the major constraint raised by participants. The result of the study revealed that supplementing local scavenging hens with additional feed could improve egg production and reduce mortality. The promising results of the current study also showed feed supplementation and training should be included in local chicken improvement package preparation programs with other interventions like health and housing.

**Keywords:** Local Hens, Scavenging, Supplementary Feeding

## INTRODUCTION

Village poultry production is an integral part of the farming systems in rural Ethiopia and plays a very important role as source of human nutrition (Tadelle and Ogle, 1997). Apart from their function as a source of food for poor people, poultry contribute significantly to the cash income and cultural life of the rural families. Additionally there are no cultural taboos related to the consumption of poultry and poultry products unlike consumption of pork. However, most of the flock in developing countries are of local eco-types and are considered to be genetically poor producers of small sized eggs and slow growers (Bagnol, 2000 and Gueye, 1998).

In developing countries small holder farmers rear chicken as scavengers, without any additional investment for feeding, health care and housing (Tadelle and Ogle, 1996; Gueye, 1998). Many studies (Halima, 2007; Fisseha, 2010) conducted in Western Amhara Region indicated that disease outbreak, mainly Newcastle disease, is the major economically important constraint for village chicken production followed by predation and seasonal feed shortage.

Until now most of the efforts that have been undertaken to improve the performance of local birds have been the introduction of exotic breeds through cross breeding and/or upgrading programmes. Very little attention has been given to other factors such as; improved feeding, housing and health care, even though these non-genetic factors have much greater effects on production parameters than the genetic characteristics (Sazzed et al., 1988).

Scavenging birds' intake of nutrients from scavenging feed resource base is sufficient for their maintenance requirement and the production of about 40-50 eggs per hen per year, but for increased production additional inputs are

needed (Tadelle and Ogle, 1997). Therefore a supplementary feeding regime needs to be developed to increase the egg production of local chickens to the point of economic optimum.

It is well known that local eco-types are more adaptive than imported exotic breeds. Local eco-types could survive and produce some amount of eggs and meat under a poor management condition. Many studies showed that the productivity of local eco-types could be enhanced through some management interventions (Halima, 2007; Abera, 2000; Nigussie et al., 2003). In this regard; an on farm trial conducted by Debre Zeit Agricultural Research Center (DZARC) showed that supplementing local scavenging hens with additional feed improved egg productivity (Tadelle and Ogle, 1997). With this point in mind, this demonstration trial was carried out with the following objectives:

- To assess the egg production performance of local hens kept under the prevailing farmers' management conditions.
- To evaluate the effect of feed supplementation on egg production performance local hens.
- To assess the economic benefits of supplementing local hens.

## MATERIAL AND METHODS

### Description of the study districts and local ecotypes

The study was conducted in three purposively selected districts (Guagsa-Shikudad, Mecha and Farta), located in the Western Amhara. Local chicken ecotypes found in these districts; Tillili, Mecha, Farta and Melo Hamusit, showed better performance on egg and meat production under intensive management system and were recommended for further improvement (Halima, 2007).

### Sampling techniques and data collection

Purposive and random sampling techniques were applied to select study villages and participants based on chicken production potential and flock size. In this technique study districts, where the selected chicken ecotypes are originated, were selected purposively and participant farmers were selected randomly. Accordingly; two kebeles from Mecha, two kebeles from Guagusa-Shikudad and four kebeles from Farta districts were selected purposely. Therefore, a total of representative administrative kebeles were selected and used for the study. After that, a simple random sampling technique was applied to choose five chicken owner participants. Hence, a total of 40 households were used for each year. Therefore, a total of 80 households were used for the study in the two successive years. The average number of local hens used for the trial per each participant households (HH) were 4.3 hens (Table 1).

**Table 1.** Number of households and local hens used for the study (N=344 hens)

Name of study kebeles and districts	Number of participants	Number of local hens/HH (Mean)	Number of local hens	
			Minimum	Maximum
Agze Garda Eliyas (Guagusa district)	20	4.1	3	5
Enashenifalen (Mecha district)	20	4.9	3	5
Awizet (Farta district)	20	3.7	3	5
Melo Hamusit (Farta district)	20	4.6	3	5
Total	80	4.3	3	5

### Management of hens

The supplementary feed was prepared at Andassa Livestock Research Center by mixing equal amount of maize and Niger seed cake. Each hen was given 60g of supplementary feed in addition to scavenging. The recommended feed was delivered twice a day, early in the morning and late in the afternoon. Feeders and drinkers were distributed to participants from the center. Training was given to all participants on how to feed birds and how to collect the relevant data. Hens were vaccinated against Newcastle disease two times in the six months trial period each year. The vaccination was given before the start of the rainy season which is believed to be the main disease outbreak seasons (Halima 2007; Fisseha 2010).

### Data collection

Data collection was made by both participants and researchers. Feed refusal was collected by participants and weighed by researchers fortnightly. At the end of the trial period a survey was conducted using structured questionnaire to assess the perception of participants on feed supplementation.

### Economic analysis

Partial budget analysis was also applied in order to evaluate the effects of feed supplementation. Current prices of the additional inputs and feed mixing costs were considered in the analysis. Labor requirement for feeding hens was negligible and not considered. The analysis was done by considering the current prices of eggs at urban and local markets.

### Data management and statistical analysis

The qualitative and quantitative data sets were analyzed using SPSS software, version 12 (SPSS, 2002). More specifically descriptive statistics and General Linear Model (GLM) were used.

## RESULT AND DISCUSSION

### Egg production performance of non-supplemented hens

The productive and reproductive history of scavenging hens was studied during the survey. The average number of eggs/hen/clutch and the number of total clutch periods/hen/year were estimated to be 13.2 and 3.9, respectively (Fisseha et al., 2014). Accordingly; the total egg production/hen/year of local hens, under existing farmers' management condition, was calculated and estimated to be 51.6 eggs (Fisseha et al., 2014). The average number of eggs/clutch identified in this study (13.2 eggs) was similar with the reported 9-19 eggs in North West Ethiopia by Halima (2007), 12-18 eggs in Nigerian local hens by Gueye (1998) and 6-20 eggs in Tanzania by Aichi and Kitalyi Andre (1998).

### Egg production performance of supplemented hens

The result of the study indicated that the average number of eggs laid by supplemented hens per day were 0.292 and 0.288 for the first and second years, respectively (table 2). The cumulative average daily egg production per hen was 0.29 eggs (ranged 0.21-0.29).

**Table 2.** Average number of eggs laid by supplemented local matured hens aged one year and above (N=344 hens) in Western Amhara, Ethiopia

Name of study kebeles and districts	Number of daily data	Av. egg/hen/day (1 <sup>st</sup> year)	Av. egg/hen/day (2 <sup>nd</sup> year)	Grand Mean (eggs/hen/day)	Min	Max
Agze Garda Eliyas ( <i>Guagusa Shekudad</i> )	3600	0.290	0.288	0.29	0.29	0.21
Enashenifalen ( <i>Mecha</i> )	3600	0.271	0.285	0.28	0.28	0.12
Awizet ( <i>Farta</i> )	3600	0.284	0.288	0.28	0.28	0.24
Melo Hamusit ( <i>Farta</i> )	3600	0.294	0.29	0.29	0.29	0.19
Total	14000	0.292	0.288	0.29	0.29	0.21

The total egg productivity of supplemented hens was calculated based on their daily performance. Accordingly, the average number of eggs laid by supplemented local hen per six months laying period were 50.78 and 51.79 eggs for the first and second years, respectively (Table 3). Therefore, the average egg production of each supplemented hen per six months period was 50.88 eggs (ranged 50.78 - 51.79).

The recorded six month's egg production of supplemented hens was comparable with the annual egg production of un supplemented local hens. The result showed that supplementation could improve the egg production performance of scavenging hens from 26.5 eggs/hen/six months to 50.79 eggs/hen/six months (Table 3). This indicated that village chicken producers could get an extra of 26.5 eggs (two times higher production) per hen per six months by supplementing hens with 60g of Maize and Niger Seed cake mix. There was no any significant difference between the four supplemented local hen ecotypes with regard to total egg production ( $p>0.05$ ). A similar study conducted by Debrezeit Agricultural Research Center (DZARC) also showed that local hens could produce 57eggs/hen/six months with daily supplementation of 60g Maize and Noug cake mix per hen (Tadelle and Ogle, 1997).

The finding of the trial was also in agreement with some feeding trials results conducted using local birds. Bigbee (1965) reported an increase of egg production from 40 to 99 eggs per hen per year in a trial conducted at Alemaya University, Ethiopia. Hadiyanto et al. (1994) also reported an increment of 47 to 103 eggs per hen per year and an increase of the clutch number from 3 to 7 by increasing amount of energy feed supplement. In the Eastern hills of Nepal, indigenous birds kept under semi-intensive management conditions produced 125 eggs per annum with 11 clutch periods (Smith, 1990).

**Table 3.** Number of eggs laid/hen/six months by supplemented hens (N=344 hens) in Western Amhara, Ethiopia

Name of study kebeles and districts	Av. egg/hen/six months (1 <sup>st</sup> year)	Av. egg/hen/six months (2 <sup>nd</sup> year)	Grand Mean (egg/hen/six months)	SE
Agze Garda Eliyas ( <i>Guagusa Shekudad district</i> )	51.34	51.86	50.89 <sup>a</sup>	0.60
Enashenifalen ( <i>Mecha</i> )	48.56	51.25	50.39 <sup>a</sup>	0.58
Awizet ( <i>Farta</i> )	51.14	51.86	50.59 <sup>a</sup>	0.69
Melo Hamusit ( <i>Farta</i> )	52.10	52.21	51.67 <sup>a</sup>	0.55
Total	50.78	51.79	50.88	0.31

<sup>a,b</sup> Least square means with different superscript within a column are significantly different ( $P < 0.05$ )

### Mortality of hens

There was no any mortality of hens during the trial period in all study districts. This might be related with the presence of vaccination against Newcastle disease and supplementary feeding. The vaccination was given two times per year before the onset of the rainy season. It is studied that well managed local birds have better disease resistant and productive capacity than scavenging birds (Halima, 2007).

## Economic analysis

The partial budget analysis result is presented in table 4. The highest net benefit of 16.9 Ethiopian Birr (ETB) per bird per six months was obtained by those participants who sold their eggs at the nearby urban markets (Debre Tabor, Merawi and Tillili). Participants who did not have access to urban market sold their eggs at the nearby local markets and earned 9.6 Ethiopian Birr per bird per six months. This showed that supplementing local hens by using locally available feed ingredients could improve income of small holder chicken producers. The best performance of maize and noug cake supplementation was due to the combined effect of both energy and protein supplements.

**Table 4.** Economic response of supplemented hens over un-supplemented hens in Western Amhara, Ethiopia

Description	Rural market		Urban market	
	ETB/egg	Total ETB	ETB/egg	Total ETB
Selling price eggs	1.50	36.6 (1.50*24.4)	1.80	43.9 (1.50*24.4)
Variable cost	Cost/bird (ETB)	Total cost (ETB)	Cost/bird (ETB)	Total cost (ETB)
Feed and mixing cost (60g/bird/day)	0.15	27.00 (0.2*180 days)	0.15	27.00 (0.2*180 days)
Net benefit (ETB)		9.6		16.9

Remark: ETB (Ethiopian Birr) is the name of Ethiopian Currency. Currently 1 USD=25 ETB

## Perception of participants

The result of the survey indicated that 78 participants (97.5%) were very happy with the supplementation and appreciated the results obtained. According to interviewed farmers, improving egg production, reducing mortality due to disease and predation (mainly in wet season) and avoiding sale of chicken (flock size reduction) were some of the advantages of feed supplementation. The result also indicated that 73 participants (91.2%) were willing to implement the supplementary feeding package by themselves in the future. Regarding the constraints, poor palatability of niger seed cake due to poor mixing was the major constraints faced by the majority (95%) of participants during the trial period.

## CONCLUSION

- The result of the study indicated that the productivity local chicken ecotypes could be enhanced by relatively simple changes in management interventions, such as housing, feeding, health care, etc.
- The result of the feeding trial and the final survey also revealed that maize and Niger seed cake supplementation resulted in an increase egg production of local hens. In this regard participants were highly satisfied with the results and motivated to invest more inputs to improve the existing village chicken production system.
- The promising results obtained from the current study showed that supplementary feeding and training should be included in local chicken improvement package preparation programs with other interventions like health and housing.
- Future research intervention could be important to replace the feed ingredients with other locally available and less costly feed ingredients.

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