Demonstration and Evaluation of Commercial Layer (Lohmann Brown) Breed in Benishangul Gumuz, Western Ethiopia

Habtamu Alebachew, Alemayehu Abebe and Dessie Abera
Ethiopian Institute of Agricultural Research, Assosa Agricultural Research Center, P.O. Box 265, Addis Ababa, Ethiopia

Key words: Age at first egg, commercial layer, farmer's management, production performance, survivability

Abstract: This study was conducted in Assosa town, Benishangul Gumuz, Western Ethiopia to evaluate the performance of Lohmann Brown commercial layer chicken breed and to introduce a small-scale commercial poultry production packages for the urban and pri-urban areas of Assosa. Six farmers from the town were selected for the study. Training was given for all the participants in regarding to poultry house construction from locally available materials, feeding management and health care of these breed. Each participant received 100 a day-old chicks and an other a day-old of 300 chicks were also kept at Assosa Agricultural Research Center (AARC), poultry research station as a comparison. In this study, the average survivability of the breed from day old until the second sixteen weeks of age among the participants was 88.3% with a mortality rate of 11.7% while the average survivability of these chickens from day old until the second sixteen weeks of age at the research center was 96.6% with a mortality rate of 3.7%. The average weight at 20 weeks of age was 1100.6 g and 1309.6 g, respectively at farmer's management and under on-station condition. In this study, it revealed that the average age of Lohmann Brown chicken breed at the onset of egg production was 145.8 days under on-farm management while 126 days at on-station condition. The hen-day egg production under farmer's management and under on-station condition at 48 weeks of age was 80.5% and 93.7%, respectively. Poultry producers participated in this research generates on average 20,518.67 Ethiopian Birr net profits during the 72 weeks of egg production period by considering poultry production as aside business. Based on this study, it can be concluded that Lohmann Brown commercial layer poultry breed can be an ideal layer for urban and pri-urban areas of Assosa town and similar agro-ecological areas too.

Corresponding Author:
Habtamu Alebachew
Ethiopian Institute of Agricultural Research, Assosa Agricultural Research Center, P.O. Box 265, Addis Ababa, Ethiopia

Page No.: 148-153
Volume: 20, Issue 6, 2021
ISSN: 1680-5593
Journal of Animal and Veterinary Advances

INTRODUCTION

Poultry production has an important economic, social and cultural benefit and plays a significant role in the provision of animal protein and family income in the developing countries. The contribution of poultry to the total global animal protein production is assumed to reach about 40% by the year 2030, the major increase being in the developing world.

With the increasing population of the country, there is an increasing demand for the supply of food. Thus, the demand for animal products is expected to increase substantially[1] and with the potential of indigenous chicken, the demand of egg and chicken meat of Ethiopian populations cannot be satisfied[2]. The most important inputs to satisfy the demand of the poultry product is introduction of improved (exotic) breed, improve feed quality, vaccine and medicaments[3]. Therefore, it is mandatory to introduce, test and adapt improved chicken breeds along with the associated technology pakages like husbandry, feeding and health care in different parts of the country. Genetically, high-yielding specialized breeds of chickens have been bred exclusively for meat (broilers) or table-egg (layers) production and they require high-level of inputs in terms of nutritional and health management to fully express their genetic potential[4]. Global breeding companies have attempted to achieve this balance by employing specific cross breeding schemes to alleviate animal protein shortage by increasing egg and meat production.

The most important inputs to satisfy the demand of the poultry product is introduction of improved (exotic) breed, improve feed quality, vaccine and medicaments[3]. Hence, enhancing production and productivity of the poultry sector in developing countries by introducing, testing and adapting such stocks along with the associated technologies like husbandry, feeding and health care packages are expected to speed up poultry development activities. Efforts are currently being made to alleviate this problem by introducing, evaluating and identifying suitable high-performing exotic breeds that can adapt to intensive and Semi-intensivemanagement conditions in Ethiopia.

Lohmann Brown layer chicken is a breed of chicken that raised specifically for egg-production. It is a crossbred that selectively bred from lines of Rhode Island Red and White Play Mouth Rock breeds. They start to lay at about 19 weeks of age, producing up to 320 eggs to an age of 72 weeks (one-year production). However, in lowland areas of Ethiopia the breed was not evaluated. Agro-ecology based evaluation of chicken breeds will enhance the economic contribution of chickens for farmers. Evaluating the production performance of Lohmann Brown chickens in a new environment like lowland areas of Ethiopia was useful and contributed to the success of their uptake. The present study was designed to evaluate the performance of Lohman Brown commercial layer breed in Assosa town with the following specific objective:

- To demonstrate and evaluate the performance of Lohmann Brown commercial layer chicken breed Assosa town
- To aware the farmers in regarding the contribution of poultry technologies for household income and food security

MATERIALS AND METHODS

This study was conducted in Assosaa town,the capital of the Benishangul Gumuz Regional state of Ethiopia. The town is located at 670 km West of Addis Ababa, the capital city of Ethiopia. It is located between 8°30" and 40°27" N latitude and 34°21" and 39°1" E. longitude. According to National Meteorological Service the average annual rainfall is 1316 mm with uni-modal type of rainfall that occurs between April and October. The altitude of the district ranges from 1500-1550 m.a.s.l. Its mean annual temperature ranges between 16.75°C and 27.9°C.

Participant selection: Six urban farmers were selected for the study after intensive discussion with urban agricultural experts of urban agriculture of Assosa town was made. Two weeks earlier to arrival of day-old chicks, houses were cleaned and disinfected using formaldehyde solution. Adjustable brooding guard was constructed with locally available materials like carton and the floor covered with 3-7 cm depth wooden shaving litter material. Chicken houses were equipped with cleaned and disinfected feeders and drinkers. A-day-old chicks were procured from private company (Alema Farms P.L.C.) from Debre Zeit town and each participant household received 100 a-day old chicks. Three-hundred a-day old chicks were also kept in Assosa Agricultural Research Center (AARC) as a control. In the station, artificial light was provided using 250-watt infra-red lump continuously provide for the first 20-24 h/day for the first three days and then reduced to 14-16 h according to the breed's guideline until the end of the study. Commercially formulated feed was purchased and provided according to the feeding guideline of the breed. The recommended feeding program concentrate on essential nutrient (protein energy vitamins and other supplements is designed to cover the requirements for top performance in every stage of development. Chickens fed starter, grower and layer feed at age of 1-8, 9-16 and 17-72 weeks, respectively and water was provided *ad libitum*.

Training: The selected farmers and respective development agents were given an intensive training regarding poultry house construction, feeding, management and health care of commercial layer (Lohmann Brown) and on data collection and construction of poultry houses and equipment.

Data collection: The data included Body Weight (BW) at 2,4,8,12,16,32 weeks of age, BW at age at first egg (AFE) at 5% of egg production, egg weight at 5% egg production, egg weight at 50% egg production, egg weight at peak egg production, Total Collected Eggs (TCE), mortality rate, costs of feed, vaccines, medicaments and veterinary services, income from sale of nonproductive/spent hens and eggs, collected for a period of 72 weeks of age. Eggs were collected from each of the households daily on group basis. Partial budget analysis was done to calculate economic data from different variable cost and income generated from different source. Field day was arranged to share experience and disseminate the technology package.

Data management and analysis: Data collected were entered into Microsoft Excel sheets and coded for analysis. Data analysis was done by using SPSS (Version 20) software.

% Hen-day egg production (HDEP) = Number of eggs collected per day/Number of hens present that day×100, Binuomote *et al*.[5], Okoro *et al*.[6] and Girma *et al*.[7].

Hen housed egg production (HHEP) = Total number of eggs laid on a day/total number of hens housed at the begining of laying period×100, Binuomote *et al*.[5], Okoro *et al*.[6] and Girma *et al*.[7].

RESULTS AND DISCUSSION

Survival rates of birds: The survivability of Lohmann Brown layer chicken breeds in the present study area was presented in Table 1. The breed's survivability rate from day old until the sixteen weeks age was observed to be 90.6% at on-farm management while on-station condition, the average survival rate of these chicken breed was 97.6% from day old until the thirty-two weeks of age. The average survivability of Lohmann Brown layer breed chicken from day old until the thirty-two weeks of age has become 88.3% with a mortality rate of 11.7% among the participants in the study areas while the average survivability of the Lohmann brown poultry breed chicken from day old until thirty-two weeks of age at the research center has become (96.6%) with a mortality rate of (3.7%). The survival rate and mortality varied among farmers and between farmer and research center could be due to differences in management from farmers to farmers. Even though difference in management observed, the mortality might be due to poor management (especially for high mortality in some farmers), inappropriate housing, watering and feeding condition.

Body weight development: The measured results on body weight development of Lohmann Brown chicken at different week of age under Assosa condition is presented in Table 2. The mean live BW was steadily increased until the 20th weeks of age. The average weight at 20 weeks of age was 1100.6 g and 1309.6 g under farmer's management and at on-station condition, respectively.

The present study revealed that the average age of Lohmann Brown layer chicken at the onset of egg production was 145.8 days under on farm management

Table 1: Survivability of Lohmann Brown chicken at the age the 1st 16 weeks to the 2nd 16 weeks

Participant*	No. of day-old chicks distributed	Survivability in 1st 16 weeks	Survivability in 2nd 16 weeks
1	100	92	88
2	100	89	86
3	100	96	94
4	100	92	90
5	100	84	83
6	100	91	89
Average (%)	100	90.6	88.33
On station	300	293	290
Average (%)		97.6	96.6

*= list of participated farmers, 1st 16 weeks = the age of the chicks from day 1 to weeks 16, 2nd 16 weeks = the age of the chicks from week 17 to week 32?

Table 2: Body weight development of chickens at different weeks of age

Participant	Body weight at 8 weeks (g)	Body weight at 12 weeks (g)	Body weight at 16 weeks (g)	Body weight at 20 weeks (g)
1	393.9	742.5	1068.3	1113.0
2	479.8	775.4	1125.6	1207.9
3	475.8	672.6		1048.1
4	391.2	754.6	1103.9	1175.6
5	473.6	711.6	987.5	996.9
6	422.5	651.2	1053.6	1062.1
Average	439.5	717.9	1079.3	1100.6
On station	524.9	842.2	1153.8	1309.6

Age at first egg lay and egg weight

Table 3: Egg weight at different production stages and age at first lay

Participant	Age at first egg lay (days)	Egg weight at 5% production (g)	Egg weight at 50% production (g)	Egg weight at (95%) peak production (g)
1	146	40.5	45	52.1
2	147	41	46	53
3	144	43	46	54.2
4	142	42.3	47	56
5	150	42.2	46	54.9
6	146	41.5	47.3	55
Average	145.8	41.8	46.2	54.2
On station	126	43.1	49	56.3

Table 4: Hen-day egg production and hen-housed egg production at different weeks

Participant	HDEPW23	HHEPW23	HDEPW48	HHEPW48	HDEPW72	HHEPW72
1	34.09	33.71	71.76	68.54	54.76	51.69
2	40.70	39.77	80.72	76.14	54.32	50.00
3	34.04	34.04	83.33	79.79	61.63	56.38
4	37.78	36.96	84.71	78.26	67.14	51.09
5	43.37	42.86	82.93	80.95	55.56	53.57
6	41.57	41.11	79.52	73.33	55.13	47.78
Average	38.59	38.07	80.50	76.17	58.09	51.75
On station	64.85	64.19	93.71	90.54	80.00	70.27

HDEPW23 = Hen-day egg production at week 23, HDEPW48 = Hen-day egg production at week 48, HDEPW72 = Hen-day egg production at week 72, HHEPW23 = Hen-housed egg production at week 23, HHEPW48 = Hen-housed egg production at week 48, HHEPW72 = Hen-housed egg production at week 72

and 126 days at on-station conditions. Similar result was reported by Farooq *et al*.[8] on commercial laying hens that showed an earlier average age at-first-of lay to be 126 days. Similarly, Petek[9] reported that commercial egg type layers started laying eggs at the age of 20-21 weeks and produced 277 eggs till 72 weeks of their production cycle. However, the present result has some difference with the report of Tadesse *et al*.[10] who have reported an average age at the onset of egg production of Koekoek and Bovans Brown chicken breed was 27.4 weeks of age.

Egg weight at different production stages: The average egg weight at initial laying stage (5% egg production) under on-station condition and under farmer's management condition was observed to be 43.3 g and 41.8 g, respectively. The result is almost similar to the weight achieved at Areka areas (40.2 g) by Aman *et al*.[11] but lower in weight than the findings reported by Tadesse[12] which was 48.84±6.77. As indicated in Table 3, the increase in egg weight was observed as the production stage increases from 5-95% (peak production) stage. The average egg weight (54.2 g) was recorded at peak stage in this study under farmer's management condition while the average egg weight (56.3 g) recorded at peak stage at the on-station management condition in this study area.

Egg production: The results of the present study on Hen-Day Egg Production (HDEP) and Hen-Housed Egg Production (HHEP) at 23, 48 and 72 weeks of age was indicated in Table 4. The HDEP under farmer's management at 23, 48 and 72 weeks were found to be 38.6, 80.5 and 58.1%, respectively. The HDEP under on-station management at 23, 48 and 72 weeks was 64.85, 93.7 and 80.0%, respectively. While the HHEP under farmers management at 23, 48 and 72 weeks were found to be 38.1, 76.17.5 and 51.75%, respectively. The HHEP under on station management at 23, 48 and 72 weeks were found to be 64.19, 90.54 and 70.27%, respectively.

Partial budget analysis: In computing the partial budget analysis, the feed, medication, chicken house maintenance and chicken cost were considered as variable costs whereas the sale of live chicken, eggs and the existing chicken till the time of this data collected were used as an income source. Based on the listed variable costs and the income earned the average income generated per individual farmers were 20518.66 Ethiopian Birr. The change in net income (ΔNI) was calculated as the difference between the change in total return (ΔTR) and the change in total variable costs (TVC): ΔNI = ΔTR-ΔTVC, ΔNI = 543425-420313 Ethiopian Birr ΔNI = 123112 Ethiopian Birr Average profit/participant = 123112÷6 Average profit/participant =20518.67 Ethiopian Birr (Table 5 and 6).

Field day arrangement: Field day was arranged when the chicken was at the age of 30 weeks, so as to create awareness as time passes by and benefits realized, all participants got a conviction to consider the technology as a viable agricultural venture. Accordingly, 156 participant farmers (113 male and 43 female), 26 researchers (22 male and 4 female), 8 woreda experts and 9 higher government of officals 2 male, 1 female, 2 male, 5 male from federal, regional, zonal and woredas levels were participated, respectively the on field day. Participant farmers show a good interest to participate on small scale-commercial poultry farming (Fig. 1 and 2).

Table 5: List and amount of variable cost for Lohmann Brown chicken breed in Assosa town

		List of variable costs					
Participants	Unit	House maintenance	Chick purchase	Transportation cost	Feed cost	Medication cost	Total
1	ET Birr	850	3200	722	67865.2	**750**	73387.20
2	ET Birr	600	3200	722	65580.8	640	70742.80
3	ET Birr	1200	3200	722	69478.8	420	75020.80
4	ET Birr	765	3200	722	56978.0	**350**	62015.00
5	ET Birr	1050	3200	722	65716.8	486	71174.80
6	ET Birr	785	3200	722	62480.4	**785**	67972.40
Average							70052.17

Bold values are significant

Table 6: List and amount of income earned from Lohmann Brown chicken breed in Assosa town

		Lists of incomes				
Participants	Unit	Sale of hens	Sale of eggs	Home slaughtered price of chickens	Home consumed price of eggs	Total
1	ET Birr	11050.0	87000.0	350.0	1765.0	100165.0
2	ET Birr	11390.0	77000.0	280.0	1050.0	89720.0
3	ET Birr	8500.0	86510.0	170.0	1560.0	96740.0
4	ET Birr	7820.0	67730.0	340.0	1800.0	77690.0
5	ET Birr	10540.0	81200.0	150.0	1150.0	93040.0
6	ET Birr	7650.0	77310.0	170.0	940.0	86070.0
Average		x	x	x	x	90570.8

ET: ?

Fig. 1: Photo taken at the time of data collection

Fig. 2: Photos taken during field day

CONCLUSION

The result of the present study showed that Lohmann Brown commercial layer chicken breeds were well adapted to the lowland areas of Ethiopian and it is a good choice for egg production under regular supply of commercially formulated layer feed. However, the overall productivity of the birds under farmer's management

condition was lower in comparison with the on-station managements but still the current evaluation and demonstration suggested the importance of rearing of Lohmann Brown commercial layer breed under small-scale production system of the study areas.

REFERENCES

01. Sebho, H.K., 2016. Exotic Chicken Status, Production Performance and Constraints in Ethiopia: A Review Asian J. Poult. Sci., 10: 30-39.
02. Geleta, T., S. Leta and E. Bekana, 2013. Production performance of Fayoumi chickens under intensive management condition of Adami Tulu research center. Int. J. Livestock Prod., 4: 172-176.
03. Tamir, S., F. Moges, Y. Tilahun and M. Hile, 2015. Determinants of adoption of exotic poultry breeds among smallholder poultry producers in North Western Amhara Region, Ethiopia. Global Sci. Res. J., 3: 162-168.
04. FAO., 2014. Decision tools for family poultry development. FAO Animal Production and Health Guidelines No. 16, Food and Agriculture Organization of the United Nations, Rome, Italy.
05. Binuomote, S.O., J.O. Ajetomobi and A.O. Ajao, 2008. Technical efficiency of poultry egg producers in Oyo state of Nigeria. Int. J. Poult. Sci., 7: 1227-1231.
06. Okoro, V.M.O., K.E. Ravhuhali, T.H. Mapholi, E.F. Mbajiorgu and C.A. Mbajiorgu, 2017. Effect of age on production characteristics of Boschveld indigenous chickens of South Africa reared intensively. S. Afr. J. Anim. Sci., 47: 157-167.
07. Girma, M., M. Urge and G. Animut, 2011. Ground *Prosopis juliflora* pod as feed ingredient in poultry diet: Effects on laying performance and egg quality. Int. J. Poult. Sci., 10: 879-885.
08. Farooq, M., M.A. Mian, F.R. Durrani and M. Syed, 2002. Egg production performance of commercial laying hens in Chakwal district, Pakistan. Livestock Res. Rural Dev., 14: 31-39.
09. Petek, M., 1999. Production traits and economic efficiencies of different genotypes of layers reared by enterprises in Bursa province and it's near vicinity. Vet. Fakultesi Dergisi Uludag Univ., 18: 65-77.
10. Tadesse, G., A. Mengistu and B. Tamir, 2016. Evaluation of the egg production performance in Bovans brown and Koekoek Chicken Breeds under varied seasons and feeding regimes in South Wollo zone, Ethiopia. Global Vet., 17: 318-324.
11. Aman, G., Y. Melese, A.J. Mesifen, A. Mebratu, T. Asirat and D. Endrias, 2016. Demonstration and evaluation of dual purpose chicken Potchefstroom Koekoek at Areka areas, SNNPR, Ethiopia. Global J. Front. Res., 16: 37-42.
12. Tadesse, D.T., 2012. Management practices, productive performances and egg quality traits of exotic chickens under village production system in east Shewa, Ethiopia. M.Sc. Thesis, Addis Ababa University, Addis Ababa, Ethiopia.