

Evaluation and Demonstration of Hubbard JV Broiler Breed at Axum and Axum Zeria, Tigray Region, Northern Ethiopia

Bruh Weldemariam¹ Alemayohu Amare² Mearg Fitsum^{1*} Dawd Ebrahim² Tadyos Habte²
Bahlbi Weldegebriel¹

1. Axum Agricultural Research Center, Tigray Agricultural Research Institute Axum Agricultural Research Center, Ethiopia, P.O. Box. 230, Axum, Tigray, Ethiopia

2. Debre Zeit Agricultural Research Center, Debrezeit Agricultural Research Center, Ethiopia
Email: meargf@yahoo.com

Abstract

This study was implemented at Axum and its surrounding to evaluate the performance and demonstrate the breed at small holder management level in 2012. From the total of 7 participants included in the study 3 were women. Total of 756 day old Hubbard JV broiler chicks were brought from Debre Zeit Agricultural Research Center and according to the house size 100-135 chicks were supplied per participant. Participant farmers were trained on poultry house and housing, health, feeding and data recording. The houses were disinfected, bedded with Tef straw and a 250 watt infrared bulb was used to heat the birds. Proper drinking and feeding materials were used to feed the chicks at ad lib basis. Vaccines were given against Newcastle and gumbro diseases. Records like daily feed intake, weekly body weight gain and mortality was taken throughout the experiments. At the end carcass characteristics was measured. Mean daily feed intake (g) and weekly weight gain (g) per bird were 79.69 ± 4.54 and 283.51 ± 18.18 respectively. The mean final weight was 1776.67 ± 109.07 at 45 days consuming 3586.05 grams of feed per bird. Average mortality of birds was 6.6% and farmers profited 26.78 birr per bird. The breed adapted well to the area as well as to the small holder production system, besides farmers showed greater interest on the breed. Eventually we strongly recommend that due attention must be given for the sustainable supply of the breed.

Keywords: Body weight gain, Day old chicks, Feed intake, Mortality, Smallholder

1. Introduction

Poultry and livestock sectors are integral parts of the farming systems in Ethiopia. The country owns large population of chickens. According to CSA (2011) report the poultry population estimated about 48.98 million. Poultry production is generally described a backyard venture in Ethiopia with little or no inputs for housing, feeding or health care. Solomon (1998) put the integration and importance of poultry that many people living in rural or urban areas in one way or the other are engaged in this activity as a side line activity in addition to their main occupation, aimed at producing eggs and meat for home consumption and to generate some additional household incomes, whereas in peri-urban and urban settings people go for intensive commercial operations. Village chickens have been contributing a lot to increase food production and income in rural communities of Ethiopia. Chicken meat is rich nutritionally and can be a good source of cheap nutrition for resource poor households, the sick, malnourished and children under the age of five (Tadelle, 1996). According to Samson and Endalew (2010) study; majority (92.4%) of village chicken were owned by female and children in the mid rift valley of Ethiopia. Gueye (2000) elaborated that poultry are a valuable asset to local populations as they contribute significantly to food security, poverty alleviation and the promotion of gender equality especially in disadvantaged groups and less favored in Africa.

Productivity of local chickens in terms of egg and meat is very low attributed to long reproductive cycle; attain small body size in long maturity period, poor health and mortality. Studies by Tadelle (1996) showed that the egg production potential of local chicken is ranged to 30-60 eggs/year/hen with an average of 38 g egg weight under village management conditions, while exotic breeds produce up to 250 eggs/year/hen with around 60 g egg weight. The total national annual poultry meat and eggs production is estimated at 72 300 and 78 000 metric tons, respectively and indigenous poultry contribute almost 99% of the national egg and poultry meat production (Tadelle et al., 2003). Considering the role of poultry and the potential of the sector the Ethiopian government has launched and implemented different production packages since 1998 to up-grade the production and reproduction performance of available local poultry breeds thereby ensuring the food security of Ethiopian households as well as increasing households' income secured from the sale of chicken products. Accordingly the national regional state of Tigray have been attempting to introduce different improved exotic breeds mostly dual types focusing to the small holder farmers to enhance egg and meat production. In case of broiler type chickens there was no attempt to introduce and demonstrate in the region as a result the knowhow and awareness on meat type breed is scant in the whole region contrary to increased demand of poultry meat in urban areas due to different reasons. Understanding the situation; Axum agricultural research center in collaboration with Debrezeit agricultural research center had developed this project. Therefore, the current study was designed **I)** to

introduce broiler chicken breeds and evaluate their performance at small holder level **ii**) to evaluate the economic benefit of broiler production at small holder level **iii**) to study the perception of small holder producers and end users on broiler production.

2. Materials and Methods

2.1. Study area and selection of participants

The trial was implemented at and around Axum city, North Ethiopia, from the end of July to the beginning of September in the year 2012. A total of 7 participants having equal proportions of women and men were selected. Discussions were made with participants about the objective, nature of the breed and the necessary things to be prepared like shelter and other required materials. After this every participant prepared poultry house that can accommodate 120 broiler chickens up to finishing with necessary equipment like brooders, brooder guard and litter. Equipment like feeders, drinkers and feeds were supplied by the center.

2.2. Birds and their management

A total of 756 day old chicks of Hubbard JV broiler breed were obtained from Debre zeit agricultural research center and transported to Axum. Since the destination site is very distant overnight rest was given at Mekele. For every participant 100 to 135 day old chicks were delivered with recommended amount of feed and vitamins. Deep litter housing system was used for this trial and floors of the houses were bedded up to 10 cm depth with straw and wood shavings. Houses were heated for half a day before entrance of chicks and brooding of chicks was done using infra-red lamp. Birds were given 24 hours artificial light supply to give them a chance to eat more. Chicks were provided sugar solution at the arrival time in order to have readily available energy source. Feed was supplied three times a day as recommended by the management guide of the breed at adlib. In addition vitamin was given for about two weeks.

2.3. Health keeping

Care full bio-security measures were followed by every farmer during the entire period, and routine vaccination against Newcastle and Gumborro diseases were given. Treatments for coccidiosis were given as it is occurred. Clean water was given adlib during the rearing period. Drinkers were cleaned daily using detergents and formalin was used at entrance as foot dust. Through litter management was practiced and any abnormalities and mortality of chicks were recorded moreover, dead birds were disposed as early as possible.

3. Data collection

All necessary data were collected throughout the trial. Feed offer and refusals were weighed once per day in the morning to determine daily and weekly feed intake. Live weight change was measured weekly and final weight of chicks was also determined. Died birds and diseases appeared were recorded on occurrences to see mortality percentages. Data on all production costs (variable costs), selling price of finished chickens, participants and consumers perceptions were collected to determine profitability, market availability and acceptance of broilers in the area. At the conclusion of the study carcass of the breed was characterized by taking slaughter weight, carcass weight for dressing percentage analysis and field day was prepared to evaluate and taste the broiler meat on one of the known hotel in the city.

3.1. Data analysis

Collected data were analyzed using SPSS, excels and simple descriptive statics. Economic analysis was done using partial budget analysis.

4. Results and Discussion

4.1. Feed intake of Birds

The average daily and weekly feed intake of birds at different growing periods is presented in the following (Table 1). Daily feed intake of birds at 1st, 2nd, 3rd, 4th, 5th, 6th and 7th (45 days) weeks were 10.3, 27.1, 56.4, 84.5, 119.7, 128.9 and 131 grams respectively. The average daily feed intake of birds during the entire period was 79.69g/bird. The total average feed intake of each bird was 3586.05 g at 45 days. The daily, weekly and total feed intake of birds recorded in this trial was lower than the genetic potential of the breed. This was mainly related to interruption of feed due to in sustained feed supply. At such conditions farmers were forced to feed their chicken only grinded maize. In addition there were some light interruptions which could affect feed intake of the birds.

The feed conversion ratio in this study at the end of 1st, 2nd, 3rd, 4th, 5th, 6th and 7th weeks were 2.24, 2.51, 2.43, 2.14, 2.4, 2.1, 2.56 and 2.4 respectively and the total average was 2.4. While the user's guide is 1.2, 1.35, 1.6, 1.8, 2.2.3 and 2.6 respectively. The highest feed conversion efficiency was recorded during the fourth and sixth weeks and the lowest was observed at the seventh week.

4.2. Growth performance of hubbard JV broiler chickens

Day old average weight of chicken was 37.8g at Debrezeit before they traveled to Axum for about 36 hours. The body weight recorded at different weeks of age is better than the reports in indigenous fowl (Padhi *et al.*, 1999; Haunshi *et al.*, 2011; Dana *et al.*, 2011; Solomon *et al.*, 2013). The average weight of birds recorded is higher than the reports in (). The average weight of birds at end of 1st, 2nd, 3rd, 4th, 5th, 6th and 7th (45days) weeks of age were 68, 86, 144.4, 306.2, 589.5, 942.4, 1401, 1776.7 grams respectively (Table- 2). The study showed that the average final weight of birds at end of 45 days finishing period was 1776.7g. The minimum weight recorded here was 1556.67 at Grum's farm while the maximum weight (1880g) was recorded at Frewein's farm. The significant weight differences observed between the minimum and the rest was a clearly management induced. Birds at Grum were restricted from feed for certain period of growth and resulted with less final weight. In general average final weight (1776.7g) recorded in this trial was lower than the genetic potential of the breed (2592g) produced under intensive production system. However the result obtained in this trial was still satisfactory and advisable for small holder farmers.

The trial was finalized by analyzing carcass of the birds. For this purpose 35 birds five from each participant were taken. Slaughter weight was taken at morning without fasting and the average slaughter weight of birds after 51 days was 2086.6g and the average carcass recorded to 1256.8g with dressing percentage of 60.2%. The dressing percentage recorded is lower than the reports in indigenous fowl (Solomon *et al.*, 2013) which ranged between 74 and 78%. Since slaughter weight was taken without fasting there could be an influence on the dressing percentage.

4.3. Mortality of Birds

Averagely 108 number of day old chickens were received by each participants and ended with an average number of 100.9 chickens as indicated in Tale- 3. It is generally agreed that the first two weeks comprise the most critical phase of artificial chick brooding (Flavio, 2012). According to Tadelle (1996), chick mortality recorded from natural brooding under village conditions in the central highlands of Ethiopia was about 60% during the first 8 weeks of age. The results of a survey conducted by Hoyle (1992) on small scale poultry keeping in Wolayta, North Omo region also indicated that, the most challenging period for indigenous baby chicks kept under natural brooding condition in Ethiopia is from 2 to 4 weeks after hatching. The results of this study showed that mortality rate of chickens was different across each growing week and the highest mortality rate was recorded at the first week of the trial and reached to 3.3% contrary to this there was no death records observed at the 3rd week. The average mortality percentage of birds recorded in this trial was 6.6%.

4.4. Profit (partial Budget) Analysis

At the conclusion of the experiment period finished broilers were sold averagely by 90 birr for single bird. The total variable cost incurred to produce a broiler finished with 1.78kg of live weight was 63.72 birr and the net profit from each broiler was 26.28 birr. Feed cost was largest and reached up to 41.72 birr per bird that accounts 65% of the total cost (Table-4)

Actually the participants used family labor by exchanging the family member and it was considered opportunity cost. Moreover, caring and keeping of the chickens was not the whole day activity it is performed in certain intervals adjusting with other activities and most of the work was performed at morning followed by simple follow-up with addition of water and feed. However; the labor was considered as fully engaged without considering side activities and it took the maximum labor cost during the peak season. This cost is accounted to 11.33 birr for every bird. Deducting this value from costs could raise net income to 37.61 from single bird.

4.5. Participants' perception on the broiler technology

All participants were happy and reflect their surprise on the potential of the breed pertaining to finishing time with up to 3kg body weight and the flavor and taste of the meat. They had a good opinion about the breed and showed willing to continue in future, if the breed will available in affordable price from nearest farms. However, they complained about the availability and the continuous sources of the breed and poultry feed. Consumers, restaurant owners and hoteliers also shared the above perception.

5. Conclusion and recommendations

The result of the study showed that the breed is adaptive and can suite to small holder producer. Higher mortality rate was recorded at the 1st week of the production period that indicated due attention must be given during this time to attain maximum profitability from such activity. The meat of this breed is very tasty, juicy and soft and liked by many consumers and market linkage has been already established hence this could be a good opportunity for maintaining broiler production in the area Therefore it is recommended that mechanisms should be devised to supply this breed to producers in a sustainable way to satisfy the growing demand of meat and hence contribute to self-food sufficiency by producing high quality food in short duration using broiler breeds.

Acknowledgements

The authors are grateful to the Debreziet Agricultural Research Center and to Tigray Agricultural Research Institute Axum Agricultural Research center for financial support to implement the study. Wereda Laelay Miachew Agricultural office and Axum town administration office are also acknowledged for their support during the research works and all farmers of the two werda of Tigray region who actively participated in this project are acknowledged.

References

- A. Getinet, D. Solomon and D. Tadelle . (2013). Feasibility of household broiler production with the use of hay box brooder in Ethiopia .International Journal of Livestock Production
 Central Statistics Authority (CSA). (2011). Agricultural sample survey report on livestock and livestock characteristics. Addis Ababa, Ethiopia, .pp 99.
- Dana N, Vander Waaij EH and van Arendonk JAM. (2011). Genetic and phenotypic parameter estimates for body weighs and egg production in Horro chicken of Ethiopia. *Tropical Animal Health and Production*, 43: 21-28.
- Gueye, E.F.(2000). Women and family poultry production in Africa. Development in practice
- Haunshi S, Niranjana M, Shanmugam M, Padhi MK, Reddy MR, Sunitha R, Rajkumar U and Panda AK.(2011). Characterizations of two Indian native chicken breeds for production, Egg and semen quality and welfare traits. *Poultry Science*, 90: 314-320.
- Padhi MK, Senani S, Rai RB and Saha SK .(1999). Performance of indigenous fowls of A and N islands.*Journal of the Indian Society of Coastal Agricultural Research*, 17(1-2): 223-225.
- Tadelle D. (1996). Studies on village poultry production systems in the central highlands of Ethiopia. MSc Thesis, Swedish University of Agricultural Sciences, pp 70.
- Tadelle, D., Million, T., Alemu, Y. and Peters, K.J., (2003). Village chicken production systems in Ethiopia: Use pattern and performance valuation and chicken products and socio-economic functions of chicken. *Livest. Res. Rural Dev.* 15(1)
- Samson L. Endalew B. (2010). Survey on Village Based Chicken Production and Utilization System in Mid Rift Valley of Oromia, Ethiopia. *Global Veterinaria*, 5 (4).

Table1. Average daily feed intake of hubbard JV broiler at Axum

List of participants	DFI at 1 st wk (g)/bird	DFI at 2 nd wk (g) /bird	DFI at 3 rd wk(g) /bird	DFI at 4 th wk (g) /bird	DFI at 5 th wk (g/bird)	DFI at 6 th wk (g) /bird	DFI at 7 th wk (g) /bird	Average DFI(g) /bird
Luel	9.0	28.8	48.64	93.64	120.88	125.88	131.86	79.5
Mulugeta	8.7	27.4	47.60	98.56	129.95	143.81	147.17	86.2
Atsede	9.6	26.5	66.66	87.33	110.37	105.50	99.10	72.2
Haile	9.5	25.6	62.6	87.66	121.80	142.45	130.00	82.8
Letbrhan	10.1	30.6	61.85	67.98	120.53	110.00	139.01	77.1
Gurum	14.2	24.6	46.84	71.30	114.97	132.83	139.55	77.8
Freweyni	10.8	26.0	60.24	85.00	119.62	142.04	130.00	81.9
Mean±sd	10.3±2.	27.1±2	56.4±8	84.5±11	119.7±6	128.9±15	131±15	79.7±4

DFI= Daily feed intake, WK=week

Table 2: Average weight changes of birds at end of each week in hubbard JV broiler evaluation trial carried at Axum town, Northern Ethiopia.

List of participants	DOC wt. (g)	Av. Wt. end of 1 st week (g)	Av. Wt. end of 2 nd week (g)	Av. Wt. end of 3 rd week (g)	Av. Wt. end of 4 th week (g)	Av. Wt. end of 5 th week (g)	Av. Wt. end of 6 th week (g)	Final Wt.(at 45 days) (g)
Lluel	37.8	59.7	139.3	270.	570.0	946.7	1423.3	1763.3
Mulugeta	37.8	65.9	138.3	283.3	570.0	993.3	1380.0	1766.7
Atsede	37.8	66.7	136.3	320.0	616.7	953.3	1526.7	1763.3
Haile	37.8	66.2	141.3	316.7	606.7	946.7	1523.3	1846.7
Letbrhan	37.8	69.2	149.3	323.3	636.7	1010.0	1250.0	1860.0
Gurum	37.8	82.7	163.0	313.3	483.3	753.3	1180.0	1556.7
Freweyni	37.8	71.6	143.0	316.7	643.3	993.3	1523.3	1880.0
Mean \pm sd	37.8	68.9 \pm 7	144.4 \pm 9	306.2 \pm 21	589.5 \pm 55	942.4 \pm 87	1401 \pm 140	1776.7 \pm 109

Table3: Number of survived birds across the growing weeks in hubbard JV broiler evaluation trial.

Name of participant	No DOC received	No of birds at the end of 1 st wk	No of birds at the end of 2 nd wk	No of birds at the end of 3 rd wk	No of birds at the end of 4 th wk	No of birds at the end of 5 th wk	No of birds at the end of 6 th wk	No of birds at the end of 7 th wk
Luel	100	99	98	98	98	98	97	97
Mulugeta	115	111	109	109	109	109	106	106
Atsede	135	132	132	132	132	131	131	131
Haile	100	92	88	88	88	88	86	86
Letbrhan	100	97	95	95	95	95	95	94
Gurum	106	104	104	104	104	104	104	103
Fireweyni	100	96	95	95	93	91	90	89
Mean	108	104.4	103	103	102.7	102.3	101.3	100.9

Table 4. Partial budget analysis for broiler evaluation trial carried at Axum.

Description	Birr per head
Variable costs	
Day old chicken cost	6.00
Feed cost	41.72
Medication cost	0.35
Water & Electricity	0.42
Bedding material	0.50
Transport (chicken)	1.5
Labor cost	11.33
House rent	1.4
Total production cost	63.72
Selling price of broilers	90.00
Net benefit (Selling price of broilers- Total cost)	26.28
Marginal rate of return	0.412