International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijarbs Coden: IJARQG (USA) Volume 9, Issue 7 -2022

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.07.030

Performance Evaluation of Cobb 500 Broilers under On-station Management in Pawe, Benishangul Gumuz, Ethiopia

Habtie Arega*[1], Ferede Alemu[1], Mezgebu Getnet[2], and Yalew Abiyu[1]
[1]Ethiopian Institute of Agricultural Research, Pawe Research Center, P.O. Box 25 Pawe, Ethiopia
[2]Ethiopian Institute of Agricultural Research, Debremarkos Agricultural Research Center, P.O. Box 357, Debremarkos, Ethiopia
Corresponding author: E-mail: habtiearegahb@gmail.com

Abstract

Cobb500 broiler is one of the world's most popular commercial meat chicken breeds. The study was undertaken to evaluate the performance of Cobb500 broiler under on-station at Pawe Agricultural Research Center. A total of 200-day-old chicks were purchased from Debre Zeit, Alema poultry farm, along with commercial broiler feeds. Appropriate vaccinations were given and the standard bio-security measures were employed throughout the experimental period (45 days). Daily feed intake, weekly body weight, mortality, variable costs and revenues were recorded. On day 45th, a total of 20 birds were randomly selected, starved and slaughtered for carcass analyses. Data were summarized using descriptive statistics. Feed intake and feed conversion ratios of Cobb 500broiler in this study were comparable to potential (values) indicated in the breeder's guidelines. The mean body weight at 45 days was 1887.08 g/bird. The mean carcass weight and dressing percentage was 1419.72g and 73.5%, respectively. The net profit per chicken was 36.92 ETB. The overall chicken's mortality rate was 1%, where all deaths occurred during the first and second weeks of age. The lower mortality rate occurrence indicated that proper management practices were employed, and also animals were better adapted to the environment. It is concluded that Cobb 500 broiler showed good growth and adaptation potential and is profitable, given that the appropriate management practices are employed as per the breed's management guideline.

Keywords: Cobb 500, Carcass, Body weight, Mortality

I. Introduction

Shortage of protein food availability is a well-known problem in Africa. Poultry is by far the largest group of species (FAO, 2000) contributing about 30% of all animal protein consumed in the world. Poultry meat represents about 33% of the total global meat production FAO (2010). According to CSA (2018/2019), the total poultry population in Ethiopia is estimated to have about 59.42 million, of which the respective85.68, 7.32 and 7% are indigenous, hybrid and exotic breeds.

Increasing the production potential of the chickens made a substantial contribution to reducing poverty and malnutrition among rural and urban poor, in addition to boosting the contribution in poultry meat share in national meat consumption from 5% to 30% by substituting red meat that comes from large ruminants which are high greenhouse gases emitting species (Shapiro et al., 2015). However, meeting the current chicken meat and egg demand for its growing population cannot be achieved by the use of the indigenous chickens due to their lower production potential.

Benishangul Gumuz Region specifically Metekel Zone is one of rapidly growing areas in the country in terms of human population, urbanization, demand for animal products and market opportunities. On the other hand, the area is one of regions deficiency of protein source diets is well noted, especially for children and mothers. In contrary, the chicken production system of the Zone is traditional scavenging and based indigenous chickens, which produce less than 52 egg per hen per year (Solomon et al, 2013). Productivity is very low due to poor management and low production potential of local chickens.

The production of commercial broilers under intensive management is flourishing in and around main cities and towns, mostly Addis Ababa and its surrounding. However, there is a steadily increasing demand for poultry products in other cities like Pawe due to increasing human population and growing economy. Pawe is becoming one of the major investment destinations in the country in association with its proximity toGrand Ethiopian Renaissance Dam and the newly established sugar company. Besides, there are huge demands from farmers, investors, organizations and regional poultry multiplication center for improved chicken breeds. Thus, introduction and production of Cobb 500broiler to the area is believed to bridge the gap between demand and supply for chicken meat. It is important to evaluate the breed performance and adaptation and profitability in Pawe prior to recommending for wider production. The objectives of this study were to evaluate the adaptation and production potential of Cobb500 broiler on-station in Pawe.

II. Materials and Methods

Description of the study area

The experiment was conducted on-station at Pawe Agricultural Research Center, Metekel Zone, Benishangul Gumuz Regional State from April - May 2019. Pawe Agricultural Research Center is located at latitude of 11° 19’ North and longitude of 36° 24’ East at an altitude of 1120 meters above sea level. It is found at a distance of 572 km North West of Addis Ababa. The mean minimum and maximum temperatures of the study area were 17.2 and 32.8 °C, respectively. The mean annual rainfall is 1574.7 mm with main wet season from June to September usually continued with a less pronounced wet period up to November (National Meteorology Agency weather data, 2009-2019).

Climatic data of experimental period (2019)

The mean monthly rainfall, minimum and maximum temperature and humidity of the study area based on annual records of Pawe Agricultural Research Meteorological Station is presented at Figure 1. Lower mean annual humidity was recorded from February to May as compared to other season of the year.

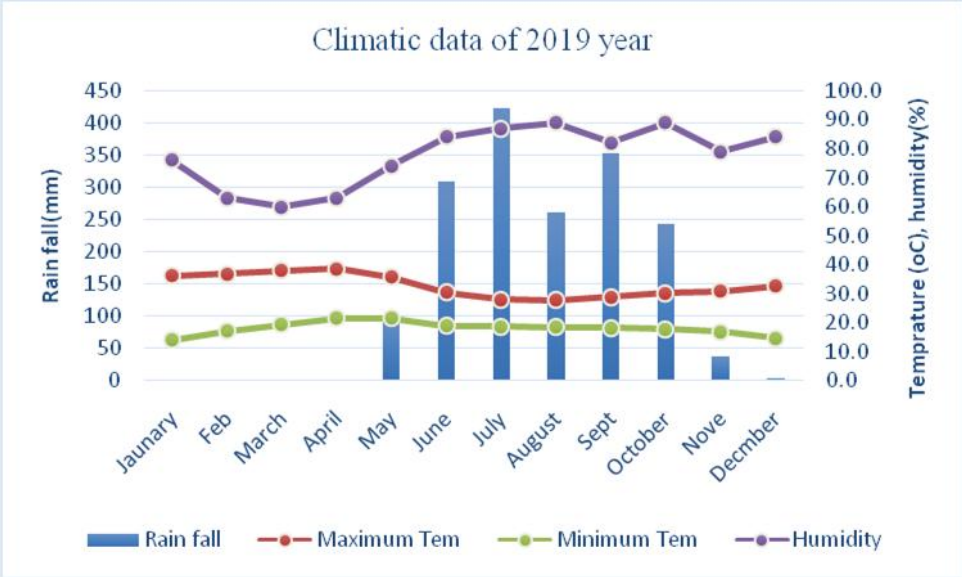

Figure 1.Mean monthly rainfall, minimum and maximum temperature and humidity of the study area based on annual records at the Pawe Agricultural Research Meteorological Station.

Chicken management

The poultry house construction and material preparation were done before commencing the study. The house was well ventilated, floor was concrete to protect rodents and ease cleaning. The floor was covered about 7-10cm depth chopped rice straw litter. The house was equipped with cleaned and disinfected feeders and drinkers before the arrival of chicken. Two-hundred-day-old Cobb 500 broilers were purchased from Alema Farm located in Bishoftu town and transported to Pawe Agricultural Research Center. Heat was provided using 200Wt bulb lamps based on the chicken reaction, meaning adjusting the height of lamps up and down by close follow up of chicken. Light has been given for 23 hours including natural day light and darken for an hour at night until the end of study. The chickens were given commercial feeds according to cobb 500 broiler performance and nutrition supplement (Anonymous, 2015). The daily feed requirement-based animal age. Water was provided *ad-libitum.* All chicken were vaccinated against viral diseases based on the Ethiopian National Veterinary Institute (NVI) vaccination guideline. Vitamins were provided during the arrival of chicks for five days to recover chicks' transportation stress. All biosecurity measures were employed throughout the experimental period based on the production manual of the breed.

Data collection and analysis

Data on daily feed intake (gram per bird), weekly body weight (gram per bird), daily weight gain (gram per bird), mortality, variable costs and revenues were taken and recorded. The daily feed intake was determined as the difference of feed offered and refused. The Feed Conversion Ratio (FCR) was calculated on weekly basis until chickens aged 45 days. Cost-benefit analysis was undertaken to assess profitability of the broilers

$$\mathbf{FCR} = \frac{Total\ amount\ of\ feed\ consumed}{Total\ amount\ of\ carcass\ produced}$$

Daily weight gain (DWG) was calculated:

$$\mathbf{DWG} = \frac{Difference\ in\ weight\ between\ hatching\ and\ fixed\ age}{Number\ of\ days\ up\ to\ the\ fixed\ age}$$

At the end of the experimental period (45 days),10% of whole chickens were randomly selected and slaughtered for carcass evaluation. A total of 20 chickens were sampled, starved overnight and weighed before slaughtered. The dressed carcass, gizzard and liver were carefully removed and weighed. The dressing percentage (DP) was calculated as weight of the carcass divided by slaughter body weight multiplied by 100.

$$\mathbf{DP} = \frac{weight\ of\ the\ carcass}{slaughter\ body\ weight} X100$$

The collected data were entered in to Microsoft Excel 2016 sheets and summarized using descriptive statistics.

III. Results and Discussion

Feed intake

The mean daily feed intake of Cobb 500 broiler is presented in Table 1. Feed intake of chickens increased with age. The daily feed offer was close to the actual feed intake from 4 weeks age and beyond. The daily feed intakes are lower than that reported for the same breed elsewhere (Dessie *et al*, 2017):24, 54, 93, 135, 174, 205 and 228g in 1st, 2nd, 3rd, 4th, 5th, 6th, and 7th weeks of age. However, the present feed intake was higher than that reported by Peter *et al.,* (2010) during the1st (14.2,14.17, 14.2g) and 2nd (47.69, 45.5, 38.36g) weeks of age for cobb 500, Hubbard JV and Ross 308 broiler chickens, in order. The result of FCR at 1st, 2nd, and 5th weeks of age were higher than that reported (1.14, 1.41 and 1.95) by Dessie *et al* (2017).

Table 1: Feed intake of Cobb 500 broiler maintained on-station at PaweTotal chickens=200)

Age in days	Number of chickens	Daily Feed offered g/ chickens	Actual Daily feed intake g/chick
1-7	199	23.61	18.56
8-14	198	53.08	50.94
15-21	198	69.29	68.69
22-28	198	75	75
29-35	198	82.86	82.86
36-42	198	99.29	99.29
43-45	198	100	100

Growth performances

Total body weight, average daily weight gain and FCR of Cobb 500 broiler under Pawe condition are presented Table 2 and 3. The mean body weight of chickens increased until 45 days old, whereas the average daily weight gain increased at certain ages and then slightly decreased. Feed efficiency of Cobb 500 broiler was higher at the later ages. Both mean body weight and daily weight gain in this study were comparable to previous study's report for the same breed (Peter *et al.*, 2010).

However, the body weight and daily body weight gain values were lower than the report for same breed performance on station and on-farm at Assosa (Dessie *et al*., 2017). The differences might be attributed to management, environmental variations and production system. The better growth performance indicates that hot humid environments like Pawe were conducive to produce broilers given that appropriate feeding and other management practices are followed. The presence of higher daily weight gain at certain weeks of age could be related to higher feed intake of the birds. The current result of FCR better than Misba *et al*., (2016), who reported 3.6 to 4.75 in different treatments of the same breed.

Table 2: Body weight of Cobb 500 broiler maintained on-station at Pawe

Age in days	Sample bird	Total body weight(g)	Average body weight (g./bird)
0	200	9570	47.85
7	199	22906.89	115.11
14	40	13245.6	331.14
21	40	26949.6	673.74
28	40	38244	956.10
35	40	54968	1374.2
42	40	68564	1714.10
45	40	75483.2	1887.08

Table 3: Average daily weight gain and FCR of Cobb 500 broiler maintained on-station at Pawe

Age in days	Sample bird	Daily weight gain (DWG)	FCR
1-7	199	9.61	1.93
8-14	40	30.86	1.65
15-21	40	48.94	1.40
22-28	40	40.34	1.86
29-35	40	59.73	1.39
36-42	40	48.56	2.04
43-45	40	57.66	1.73

Carcass characteristics

Slaughter weight, carcass and organs' weight of Cobb 500 broilers aged 45 days are presented in Table 4. The overall mean for slaughter weight was 1930 g/bird (ranging from 1714 to 2342g). The overall mean of carcass weight was 1419.72g (1233 to 1768 g). The value of dressing percentage recorded in the present study was higher than values reported for the same breed by Dessie *et al* (2017), i.e., 60.4 and 60.9% at 49 days old and 65.2 and 57.2% at 56 days old for male and female chickens, respectively. The higher dressing percentage indicated higher carcass yield. On the other hand, the current dressing percentage was higher than 72.69% reported for Cobb 500 broiler slaughter at 2000g body weight (Anonymous, 2015).

Table 4: Carcass characteristics **and weight of organs for Cobb 500 broiler aged 45 days and maintained on-station at Pawe**

Measured parameter	N	Mean	Minimum	Maximum
Slaughter weight	20	1930	1714	2342
Carcass weight	20	1419.72	1233	1768
Gizzard	20	35.05	29	49
Liver	20	34.05	26	40
Total edible	20	1488.94	1301	1827
Dressing percentage (%)	20	73.5	71.5	76.14

Experimental chickens' photos

Mortality and survivability rates of Cobb 500chickens are presented in Table 5. Only two chickens were lost due to disease in the first and second weeks of age. The overall mortality rate was low (1%), indicating that proper management practices (feeding, housing and health care) were employed and animals were adapted to the environmental and management. The current mortality values are lower than 7.8% mortality for on-station and on-farm studies at Assosa for Cobb 500 broilers (Dessie *et al.*, 2017).

Table 5: Survivability and mortality data of Cobb 500 chickens maintained on-station at Pawe

Age in days	Total bird	Survived(N)	Mortality(N)	Survivability (%)	Mortality (%)
0	200	200	0	100	0
1-7	200	199	1	99.5	0.50
8-14	200	198	1	99	0.50
15-21	200	198	0	99	0
22-28	200	198	0	99	0
29-35	200	198	0	99	0
36-42	200	198	0	99	0
43-45	200	198	0	99	0
Total	**200**	**198**	**2**	**99**	**1**

Cost-benefit analysis

The cost-benefit analysis was done to evaluate the economic benefit of producing broilers (Table 6). Feed accounted for 41.27% of total variable costs followed by labor cost (23%) and cost of day-old chicks (17.87%). The net profit of 36.92 birr per chick indicates that raising Cobb 500 broilers can be an attractive business in the study area. Similar study conducted on the same breed at Jimma town indicated that the net profit per chick was 37 Birr (Getine *et al*., 2013). The current profit was lower than 41 birr/chick reported by Dessie *et al* (2017). The lower net profit in the present study could be due to growing variable costs, especially cost of feed, transportation cost, wage and day-old chicks. However, our net profit was higher than 27 birr/chick reported for Hubbard JV breed at Axum town (Bruh *et al*., 2015) and 11 birr/chick for Hubbard Classical broiler breed at Bahir Dar town (Moges *et al*., 2014)

Table 6: Economic evaluation of Cobb 500 broiler under on-station at Pawe

Variable cost per income	Amount (Birr)	Proportion of cost (%)
Total price of day-old chickens(n=200)	4000	17.87
Feed cost	9240	41.27
Vaccination and medication costs	375	1.67
Transportation of feed and day-old chickens	3000	13.40
Labor cost	5175	23.11
Electricity cost	100	0.45
Litter and other costs of poultry house preparation	500	2.23
Total variable cost	**22390**	100
Total cost per chicken	113.08	-
Average market (sale) price per chicken	150	-
Total income generated (survived chicks x chicken price)	**29700**	-
Net profit per chicken	**+36.92**	-

Conclusion

Cobb 500 broilers showed good performances in terms of feed intake, feed efficiency, body weight gain and adaptation under on-station management in Pawe. The higher cost associated with Cobb 500 broiler production can be minimized by substituting the commercial feed by feeds formulated from locally available feed ingredients and also by using the family labor. The lower mortality of chickens indicated that proper management practices were applied, and indeed chickens were adapted to the area. The study indicated that broiler production at Pawe is worthwhile given that appropriate management is followed. Further studies on the breed performances up to 56 days of age are suggested.

References

[1] Anonymous, 2015. Cobb500 broiler performance and nutrition supplement guide. https://cobb-guides.s3.amazonaws.com/a71b8bc0-bbd4-11e6-bd5d-55bb08833e29.

[2] Bruh, W., A. Alemayehu, F. Meareg, E. Dawud, H. Tadyos and W. Bahlbi, 2015. Evaluation and demonstration of hubbard JV broiler breed at axum and axumzuria, Tigray Region, Northern Ethiopia. J. Biol. Med. Sci., 3: 8-12.

[3] CSA (Central Statistical Agency). 2018/2019. Agricultural Sample Survey Volume II Report on Livestock and Livestock Characteristics.

[4] Dessie Abera, Alemayehu Abebe, Fekadu Begna, Alayu Tarekegn and Misba Alewi, 2017.Growth performance and carcass characteristics of Cobb 500 commercial broiler under small-scale production in western Ethiopia. Asian Journal of Poultry Science, 11:49-56.

[5] FAO (Food and Agricultural Organization of the United Nation), 2010. Draft guidelines on phenotypic characterization. Intergovernmental technical working group on animal genetic resources for food and agriculture and commission on genetic resources for food and agriculture Rome. 24-26 November 2010. pp 87.

[6] FAO (Food and Agricultural Organization of the United Nation). 2000. World watch lst for domestic animal diversity. FAO (Food and Agriculture Organization of the United Nations), 3ed edition. Rome, Italy. pp 727

[6] Getinet, A., D. Solomon and D. Tadelle, 2013. Feasibility of household broiler production with the use of hay box brooder in Ethiopia. Int. J. Livest. Prod., 4: 70-77

[7] Misba Alewi, Alemayehu Guteta and Etalem Tesfaye. 2016 Effects of Feeding Malt Barley Sprout as a Protein Inclusion in Broiler Ration, Proceedings of the Annual National Review Workshop on Results of Livestock Research, 30 June 02 July 2015, held at Holetta Research Center, Holetta, pp233-238.

[8] Moges, F., M. Nega, H.M. Asefa, A. Yetayew and G. Zeleke, 2014. On-farm evaluation of broilers for their adaptability and productivity at small holder level in Bahir Dar city, Ethiopia. Online J. Anim. Feed Res., 4: 137-143.

[9] Peter Hascik, Miroslava Kacaniova, Michal Mihok, Jaroslav Pochop and Emilia Benczova, 2010. Performance of various broiler chicken hybrids fed with commercially produced feed mixtures. International Journal of Poultry science, 9:1076-1082.

[10] Shapiro, B.I., Gebru Getachew, Desta, S., Negassa, A., Nigussie, K., Aboset Gezahegn and Mechal Henok. 2015. Ethiopia livestock master plan. ILRI Project Report. Nairobi, Kenya: International Livestock Research Institute (ILRI)

[11] Solomon Zewdu, Binyam Kassa, Bilatu Agza and Ferede Alemu. 2013. Village chicken production systems in Metekel zone, Northwest Ethiopia. Journal of Agricultural Research, 2(9), pp: 256 – 262.

Access this Article in Online	
	Website: www.ijarbs.com
Quick Response Code	Subject: Poultry Science
DOI:10.22192/ijarbs.2022.09.07.030	

How to cite this article:
Habtie Arega, Ferede Alemu, Mezgebu Getnet' and Yalew Abiyu. (2022). Performance Evaluation of Cobb 500 Broilers under On-station Management in Pawe, Benishangul Gumuz, Ethiopia. Int. J. Adv. Res. Biol. Sci. 9(7): 295-302.
DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.07.030