

A Study on Nutritional Status and Performance of Broilers under Backyard Management for Nutritional Intervention and Profitable Farming in Mizoram

Rajat Buragohain*

Assistant Professor, Department of Animal Nutrition,
College of Veterinary Sciences and Animal Husbandry,
Central Agricultural University, Imphal Selesih, Aizawl (Mizoram) India.

(Corresponding author: Rajat Buragohain*)

(Received 09 September 2022, Accepted 19 October, 2022)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Nutritional assessment is very important for appropriate feeding management of poultry birds and for nutritional interventions utilizing the available feed resources for economic feeding. Inadequate feeding significantly affects performance of the birds and profitability of the enterprise. The present study assessed the feeding management, growth performance and nutritional status of broiler birds under backyard feeding management in Mizoram. One hundred and fifty small to medium poultry farmers, selected from 10 villages each of *Tlangnuam* and *Thingsulthliah* rural development blocks of Aizawl district, were interviewed through a pre-tested semi-structured questionnaire. Information on growth rate at different stages, feeding management data and mortality records were collected and representative samples of feeds fed to broilers were sampled for nutritional analysis. The study revealed rearing of broilers in small flock size of 10 to 50 numbers (averaging 23.33 ± 2.75) and average mortality rate of 6.94 ± 1.57 recorded at 42nd days of age. Availability of quality chicks and feeds were not consistent throughout the year. Proximate analysis of different broiler feeds revealed lower crude protein levels, but higher energy density considering BIS (2007) standard for broiler birds. Intakes of feeds were lower and lower growth rate at different stages under backyard management were recorded. Deficient intakes of protein were recorded during the initial growing period. Energy density of the rations and intakes of energy were higher than their requirements. The findings of the study indicated lack of adequate scientific knowledge about feeding of broilers among the farmers and local constraints affecting broiler farming. Acquiring knowledge from Veterinary professionals about scientific broiler farming, and nutritional interventions through feeding of balanced rations utilizing available feed resources meeting the nutritional needs and intakes, supplementations of deficit nutrients, regular quality checking of feeds were recommended for profitable and sustainable broiler farming in Mizoram.

Keywords: Backyard farming, broiler, growth, feed intake, nutrient intake, mortality.

INTRODUCTION

In the recent years, broiler farming has become a livelihood activity for the people of Mizoram. This is due to uncertainty in piggery for the spike of deadly diseases like Porcine Respiratory Reproductive Syndrome (PRRS), Classical Swine Fever (CSF), African Swine Fever (ASF) etc. in the recent past resulting in huge economic losses in the piggery sector of the state. The total meat production from broilers was estimated at 4155.396 tonnes during 2021-22, which is nearly 28% of the total meat production of the state (Economic survey of Mizoram, 2021-22). While chicken production has increased, there is significant fall in pork production for the very recent ASF pandemic in the state. The per capita availability of meat was 11.26 kg/year during 2021-22 against the ICMR recommendation of 12.41 kg/year with the demand gap of 1540.559 tonnes in Mizoram. For the deficit production of meat, the state has to depend on its

neighbouring states (mainly Assam and Tripura) for meeting its demand.

Broiler farming has many advantages than other livestock farming practices in Mizoram. Broilers are efficient converter of feed, require less rearing space, faster and early return for faster growth potential, involve lesser risk compared to layer production. The state has huge demand for broiler meat, which is growing day-by-day with the population growth. Undulating topography, harsh climatic condition and remoteness cause many constraints for livestock farming compared to broiler farming. Broiler farming ensures remunerative returns within very short period with minimal initial financial investment and can bring about rapid economic growth (Sharma *et al.*, 2021) particularly the weaker section of the society having limited resources and financial capability.

Balanced economic feeding is the main determiner of profit margin in broiler enterprise as feeding cost

accounts for nearly 65-70% of the total recurring expenses. Balanced feeding ensures good health which is vital for exploring the full genetic potentiality of the today's broiler strains.

Broilers are reared mostly under backyard and at small scale in Mizoram. As reported, the growth rate of broilers and body weight at marketing age (*i.e.*, 42 days) were significantly less under backyard management in Mizoram (Fanai, 2008; Renthlei, 2015). Considering the vital role of broiler farming for economic sustainability of rural people, in the present study, an attempt was made for assessment of feeding management practices and performance of broiler under backyard management to evaluate the nutritional status for interventions for optimum productivity and sustainable profit from broiler farming in the state.

MATERIALS AND METHODS

Study area and selection of respondents. The study was conducted in Aizawl district of Mizoram, India in two rural development blocks of the district, namely *Tlangnuam* and *Thingsulthliah*. Five villages in each rural development block were selected for surveys using a pre-tested semi-structured questionnaire to generate data and samples for the study and were used to generate information of the study areas. Total 15 families in each villages rearing broiler birds were interviewed to collect information on rearing and feeding practices of broilers. Helps from the village heads, local village council were taken in selecting families of the respective villages in each of the rural development blocks of the district.

Information and materials collected. The farm families were interviewed during the survey to collect information on the numbers of one-day old chicks purchased per batch for rearing and numbers of birds survived per batch at the time of selling. Information on feeding practices adopted by the farmers, types of broiler feeds utilised for feeding to the broilers and their sources, average quantities of different broiler feeds utilized per batch, body weight of the broilers at different stage were also collected. Sampling of feeds were made from each farm families following standard procedure of sampling concentrate feeds. Feed samples collected from each farmer of a village were pooled together to get representative samples of each type.

Analytical methods and statistical analysis of data. The representative feed samples were analysed for proximate composition following methods of AOAC (2012). The metabolizable energy (ME) content of the feed samples was calculated by using the values of crude fibre (CF), ether extract (EE), and total ash percentages following the formula of Wiseman *et al.* (2002). The formula was -

$$\text{ME (Kcal/kg)} = 3951 + (54.4 \times \text{EE}) - (88.7 \times \text{CF}) - (40.8 \times \text{Ash})$$

Where, CP is the crude protein (%), EE is the ether extract (%) and Ash is the Total Ash (%) on dry matter basis of the feed samples.

The sample means and standard errors were calculated using MS office excel using the standard formula.

RESULTS AND DISCUSSION

Flock size of broilers under backyard rearing. The flock size of broilers reared by farmers under backyard in Aizawl district of Mizoram varied from meagre 10 to 50 numbers averaging 23.33 ± 2.75 . It was observed that small flock size might be one of the reasons for lower profit margin of the farmers. In Mizoram, as farmers faces problems in getting of quality broiler chicks and feeds for dependence to other states particularly during the rainy season. Broilers farmers have constraints of sufficient suitable space for construction of poultry shed in rural Mizoram for undulating topography. High transportation cost is another problem due to hilly terrains and harsh climatic conditions. These constraints might contribute to restraining to smaller flock size by the farmers in spite of huge demand of broilers in the state.

The main source of day-old broiler chicks was from Guwahati, however as informed by the farmers, retailers claimed it from many other sources even from Kolkata and Tripura. Strains available with the retailers in Aizawl city were mainly the Cobb varieties. As observed quality consistency of day-old broiler chicks was not maintained in spite of purchasing the same strain of day-old chicks from the same retailer. The price of day-old chick varied from Rs. 50 to 75/chick depending on variety and quality. Ngongolo and Chota (2021) also reported smaller flock size varying from 42.55 ± 5.54 to 124.56 ± 35.08 in the *Dodoma* region of Tanzania under intensive rearing system. Elkhoraibi *et al.* (2014) also reported smaller flock size ranging from 1 to 5 birds in 43.5% of cases, 6 to 10 birds in 28.3%, 11 to 20 birds in 15.7%, and only 12.5% of respondents kept more than 20 chickens under backyard production system in the United States which was mostly attributed to living environment. Rawat *et al.* (2015) observed average flock size maintained by a household in rural areas of *Mahoba* as 22.53 ± 9.92 , which was similar to our present study, and was observed to be for household consumption, cash income, social and cultural activities. Similarly, smaller flock size under rural backyard production in different regions of South East Asia were also reported Dorji and Gyeltshen (2012); Sankhyan *et al.* (2013).

Feeding management of broilers under backyard in Mizoram. The survey revealed that farmers generally purchased commercial broiler feeds which are available in nearby markets. Undulating topography caused difficulty in transportation of feeds from market to farm place. High local transportation cost was another hindrance for the farmers which compelled them to consider the convenience rather than brand and quality of commercial broiler feeds. As reported by Sailo and Das (2018), most of the broiler farmers purchased feed from the local markets and only 7% farmers depend on Government supply for broiler feeds. In rainy season, landslide and road block were the common phenomenon in Mizoram and during this season, farmers even found difficulty in getting sufficient quantities of their required feeds.

To cope up their shortage, they were compelled to mix the locally produced grains and their by-products with the commercial broiler feeds to compensate the deficit supply. It was also told by considerable numbers of farmers (15% of the total farmers surveyed) that they sometimes incorporate cut leaves of unconventional trees and herbs along with the commercial broiler feeds. According to the farmers, incorporation of leaves and herbs prevented diseases and gave yellowish colour to the skin and shank of broilers which was the preference of local customers.

During the finishing stage, mostly before 2-3 weeks of marketing, farmers were observed to feed some extra boiled rice and ground maize to the broilers to make them fatty. Fatty broilers of 4-5 kg were the local customer preference in Mizoram.

All types of feeds are available in local markets (mash, crumble and pellet) from different companies. However, it was observed that farmers did not prefer mash feed, although less costly compared to others, for wastage and also for less feed efficiency.

Nutritional composition of broiler feeds. Nutrient composition of the randomly collected broiler pre-starter, starter and finisher feeds were presented in Table 1. The average moisture (%) of all the feeds collected from farmers' house was 10-11% which was acceptable as per standard (BIS, 2007). However, the

average crude protein (% on dry matter basis) were lower than the standards (BIS, 2007) in all types of broiler feeds. Except crude protein (%), however, other nutrients were found to be at optimum levels. The findings, thus, indicated that commercial broiler feeds used by the farmers had lower protein value which might be one of the probable reasons of lower growth rate of the broilers. Wider calorie protein ratio attributed for mixing of boiled rice and locally produced grains with the commercial feeds might also cause less protein consumption. Haque *et al.* (2019) also reported lower values of crude protein, crude fibre, ether extract and ash in broiler starter and finisher feeds in samples collected from different broiler farms than the values of the manufacturers in Bangladesh. However, Khan *et al.* (2008) reported protein (CP%) and energy (ME Kcal/kg) values of commercial broiler feeds collected from commercial farms of Bangladesh as per the requirements of broiler birds for various stages of their growth. The energy level (ME Kcal/kg) in all the feeds collected from the farmers were calculated to have more energy than required (BIS, 2007) for broilers. Higher energy level might be the probable reason for lower feed intakes at all the stages (Table 2) which might resulted not only deficient intake of protein, but also other nutrients predisposing lower growth rates.

Table 1: Average proximate composition (% on DM basis) of commercial broiler feeds available at Aizawl, Mizoram (N=10).

| Nutrients | Types of Broiler Feed | | |
|----------------------------|-----------------------|---------------|---------------|
| | Pre-starter | Starter | Finisher |
| Dry matter (%) | 89.73±0.21 | 89.72±0.22 | 89.92±0.16 |
| Crude protein (%) | 19.31±0.43 | 19.44±0.50 | 16.23±0.32 |
| Ether extract (%) | 4.07±0.22 | 4.44±0.39 | 4.94±0.21 |
| Crude fibre (%) | 4.92±0.34 | 5.09±0.45 | 4.56±0.33 |
| Total ash (%) | 6.08±0.15 | 5.99±0.11 | 6.13±0.21 |
| Acid insoluble ash (%) | 0.36±0.05 | 0.65±0.04 | 0.48±0.07 |
| Nitrogen free extract* (%) | 65.62±0.49 | 64.95±1.10 | 68.13±0.57 |
| ME (Kcal/kg) * | 3488.48±33.18 | 3496.68±33.99 | 3565.72±32.56 |

* Calculated values

Feed intake and growth rate of broilers under backyard management. The average daily feed intake and body weight gains of broiler birds are presented in Table 2 and Fig. 1 and 2. The results revealed that feed intake was lesser than the standard feed intakes of Cobb broilers. As indicated by table 1, it might be for higher energy density of the rations calculated from their proximate composition because birds always ate for energy requirement. This might also be for lower protein levels in the feeds. As observed during the interactions with the farmers, all the farmers mixed boiled rice and ground maize with the commercial broiler rations and it might be the probable reason for high energy density in the offered feeds. Contrary to our findings, Musa *et al.* (2021) recorded average daily feed intake of 591.68±20.31, 929.65±20.49 and 1128.76±80.45 g/bird/day respectively at 3rd, 5th and 6th week of age under standard feeding management and Rudra *et al.* (2018) recorded higher feed consumption in Cobb broilers ranging from 2.9 to 3.6 kg/bird, which might be for rearing under commercial establishment. Thus, for our study, it was revealed that feed consumption of the broiler birds was lesser than the

standard feed consumption and this might be for higher energy density and mixing of feeds with high energy local grains and unconventional leaves and herbs for lack of knowledge about scientific feeding management of broilers in parts of the farmers.

Table 2: Average feed intake (g/bird/day) and body weight (g) of broilers at 21st, 35th and 42nd day of age under backyard system in Mizoram (N=10).

| Age (day) | Average body weight (g) | Feed intake (g) |
|-----------|-------------------------|-----------------|
| 21 | 494.30±6.18 | 61.46±0.22 |
| 35 | 1189.50±7.68 | 148.10±0.55 |
| 42 | 1803.4±52.11 | 188.30±0.72 |

The lesser body weight gain as recorded during the survey period from the farmers (Table 2 and Fig. 2) and average body weight at 42 days of age (1803.4±52.11g) might also be for deficient nutrient intakes for reduced feed consumption. Pathak *et al.* (2015) reported average body weight at 6th week as 1967.95±3.07 kg for Cobb broilers.

Lack of proper management practices, supplementation of grains or kitchen wastes, local non-descript herbs etc. might also result lower body weight at standard marketing age in rural Mizoram. Similar findings were also reported by Yadav and Bhimawat (2020) for Kadaknath poultry in rural Rajasthan.

The requirements of protein (g protein/day) and energy (ME Kcal/day) calculated considering the average body weights and body weight gain at 21st, 35th and 42nd days of age, and nutrient consumed calculated based on average feed intake, and nutritional composition of feed are presented in Table 3. The results revealed that energy intakes were sufficient, whereas protein consumptions were deficient during the initial phase. However, protein consumption was found to be sufficient during the latter part of finishing period and it

might be for less protein requirement during the finishing stage. As active growth is characteristic feature of present-day broiler strains, reduced growth during the initial growing phase might resulted lesser final body weight at marketing age of broilers under backyard management in Mizoram. Ghosh and Sahu (2017) studied comparative performance of some improved poultry breeds under backyard management in West Bengal and recorded highest average adult body weight of 2008.3 g for *Divyayan red* and concluded that poor management might contributed to lesser growth under backyard condition. Similar finding was also reported by Kumar *et al.* (2019) for coloured broilers under hot and humid conditions.

Table 3: Protein and energy requirements and amounts consumed by broilers under backyard management at 21st, 35th and 42nd days of age.

| Age (day) | Nutrient required* | | Nutrient consumed** | |
|-----------|--------------------|---------------|---------------------|---------------|
| | CP (g/day) | ME (Kcal/day) | CP (g/day) | ME (Kcal/day) |
| 21 | 13.09 | 152.30 | 11.95±0.04 | 214.91±0.78 |
| 35 | 20.34 | 264.49 | 24.04±0.09 | 528.08±1.94 |
| 42 | 26.85 | 353.93 | 30.56±0.12 | 671.43±2.55 |

* Calculated considering the average body weight, body weight gain of broiler at 21st, 35th and 42nd days of age.
 ** Calculated based on average feed intake, and nutritional composition of feed.

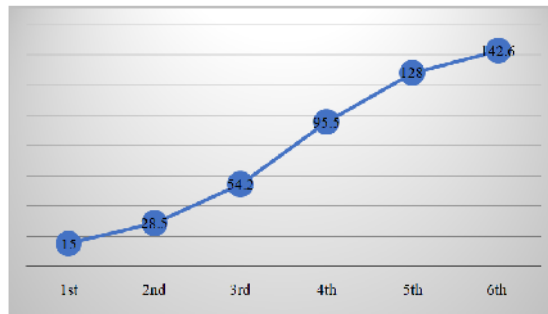


Fig. 1. Average daily feed intake (g/bird/day) from 1st to 6th week under backyard management.

Mortality of broilers under backyard rearing. Mortality percentage of broilers, as recorded from the farmers, was observed to be highly variable. For some farmers recorded no mortality, whereas some other farmers reported mortality up to 13%. The average mortality percentage was calculated as 6.94±1.57 among the farmers and was higher than 2-3% mortality as reported by Rudra *et al.* (2018) for Cobb broilers. Buragohain and Kalita (2010) also reported higher mortality of broilers reared under deep litter system of management in Mizoram and observed that higher mortality was relating to as cites syndrome (34.3%) followed by colibacillosis (19.23%), yolk sac infection and omphalitis (12.18%) and caecal coccidiosis (8.33%). Uddin *et al.* (2011) recorded 32.38% (n = 1198) morbidity and 21.30% (n = 788) mortality in chickens in commercial farms of Bangladesh. Deficient nutrient intake affecting health and immunity, retarded growth, unhygienic feeding management at backyard, lack of vaccination and deworming records, poor water quality etc. might contributed to higher mortality of broilers under rural backyard management in Mizoram. Jamlianthang *et al.* (2018) also recorded 4.44% mortality in broiler provided with untreated steam water

in Mizoram and recorded improvement in growth performance when provided wholesome filtered water to broiler birds.

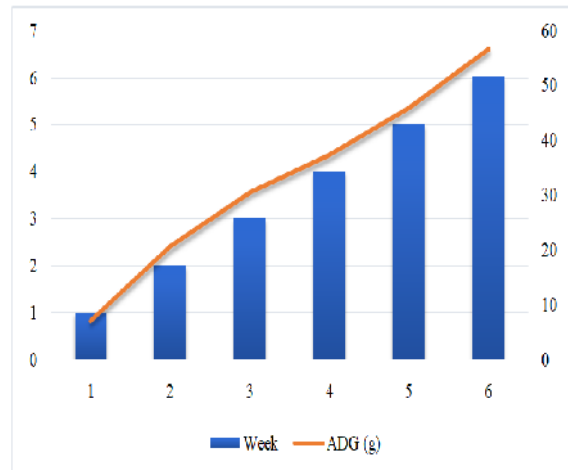


Fig. 2. Average body weight gain (g) of broiler under backyard management.

CONCLUSION

From the findings of the present study, it was concluded that smaller flock size and lower growth rate of broilers under backyard in Mizoram might be for topographical constrains, constraints relating to quality chick and broiler feeds and lack of knowledge about scientific feeding and management. High energy density of the broiler rations might cause deficient intakes of protein and other nutrients for lower feed intakes. Higher mortality of broilers under backyard rearing might be for compromised immune status of the birds. Nutritional interventions with balanced rations at right amount and time and supplementations of deficient nutrients were suggested for profitable broiler farming in Mizoram. Farmers may be suggested for regular nutritional analysis of the feeds at CAU/ICAR/KVK laboratories to ensure their nutritional adequacy and getting advice from Veterinary professionals for proper feeding. Farmers may further be suggested to follow scientific management practices and to increase flock size to get remunerative profit from broiler farming.

FUTURE SCOPE

Economic feeding is the need of the hour for the farmers and therefore, regular analysis of feeds provided to the broiler birds to ensure nutritional adequacy and their appropriate utilization are the keys for optimum performance of the broiler birds and better profit from broiler enterprises.

Acknowledgement. The author is thankful to Central Agricultural University, Imphal for providing the financial support and laboratory facilities to carry out the study successfully. The author also acknowledges supports received from village heads, local village councils of surveyed villages of *Tlangnuam* and *Thingsulthiah* blocks of Aizawl district in selecting farm families, collecting data and sampling of feeds during survey periods.

Conflicts of Interest. None.

REFERENCES

- AOAC (2012). Official Methods of Analysis of AOAC International, 19th Edition, AOAC International, Gaithersburg, Maryland, USA.
- BIS (2007). Poultry Feeds Specification, 5th Revised Edition, New Delhi, IS 1374.
- Buragohain, R. and Kalita, G. (2010). Assessment of mortality pattern of broiler under intensive system of management in Mizoram. *Tamilnadu Journal of Veterinary and Animal Sciences*, 6: 239-241.
- Dorji, N. and Gyeltshen, T. (2012). Characterization of family poultry production in Haa and Mongar districts of Bhutan. *Livestock Research for Rural Development*, 24: 155.
- Economic Survey of Mizoram (2021-22). Economic Survey of Mizoram (2021-22) published by Planning and Programme Implementation Department, Government of Mizoram, Aizawl, Mizoram, pp. 60-63.

- Elkhoraihi, C., Blatchford, R. A., Pitesky, M. E. And Mench, J. A. (2014). Backyard chickens in the United States: A study of flock owners. *Poultry Science*, 93: 2920-2931.
- Fanai, R. L. (2008). Comparison of broiler performance under backyard system and intensive system. M.V.Sc. thesis submitted to Central Agricultural University, Imphal, Manipur.
- Ghosh, S. and Sahu, N. C. (2017). A comparative study on growth and production traits of improved poultry breeds under backyard management practices in South 24 Parganas district of West Bengal, India. *Explor. Anim. Med. Res.*, 7(1): 84-86.
- Haque, A. M., Akteruzzaman, Md., Ahamed, T., Hashem, M. A., Haque, S., Mohiuddin, M., Akter, S. and Islam, M. (2019). Nutritional composition and sensitivity analysis of poultry feed mills in Bangladesh through experimental economics approach. *Agricultural Research and Technology*, 21(2): 78-89.
- Jamlanthang, Goswami, R., Hmar, L., Buragohain, R., Khate, K., Saikia, P. and Das, H. (2018). Effect of water quality on the performance of broilers. *International Journal of Agriculture Sciences*, 10(12): 6472-6473.
- Khan, M. M. H., Chowdhury, B., Bhuiyan, M. R. H., Uddin, M. J., Dawlatana, M. and Rahim, M. (2008). Nutrient content of poultry feed used in different poultry farms in Bangladesh. *Bangladesh J. Sci. Ind. Res.*, 43(1): 1-12.
- Kumar, F., Behura, N. C., Sahu, B., Mishra, P. K. and Agrawal, R. (2019). Performance of coloured broilers in hot and humid climatic condition. *Int. J. Sci. Environ.*, 8(2): 365-370.
- Musa, D., Saadu, A. and Makwashi, M. (2021). Assessment of performance of broiler birds fed with different forms of feed (Pellet, crumble and Mash) in Sokoto state, Nigeria. *Journal of Research in Agriculture and Animal Science*, 8(8): 68-72.
- Ngongolo, K. and Chota, A. (2021). Chicken production, flock size, management systems, and challenges in the Dodoma region in Tanzania. *Poultry Science*, 100: 101136.
- Rawat, S. K., Gupta, R. and Narain, S. (2015). Study on the performance of backyard poultry production reared by rural woman in Mahoba. *Indian Res. J. Ext. Edu*, 15(4): 24-28.
- Renthlei, A. L. (2015). Effect of age and rearing system on the performance of broilers in Mizoram. M.V.Sc. thesis submitted to Central Agricultural University, Imphal, Manipur.
- Rudra, P. G., Hasan, T., Rony, A. H., Adrian, G., Debnath, A., Islam, F. and Paul, P. (2018). Economic Profitability of Broiler Farm Comparing the Two Commercial Broiler Strain. *Austin J. Vet. Sci. and Anim. Husb*, 5(2): 1045.
- Sailo, L. and Das, S. (2018). A study on broiler farming practices followed by the farmers in Mizoram. *International Journal of Bio-resource and Stress Management*, 9(4): 518-522.
- Sharma, S., Rathore, R. S. and Sharma, F. L. (2021). A scale of measure the attitudes of beneficiaries and non-beneficiaries of ARYA project towards poultry farming. *Indian Res. J. Ext. Edu*, 21 (2&3): 16-19.
- Sankhyan, V., Katoch, S., Thakur, Y. P., Dinesh, K., Patial, S. and Bhardwaj, N. (2013). Analysis of characteristics and improvement strategies of rural poultry farming in north-western Himalayan state of Himachal Pradesh, India. *LRRD Newsletter*, 25(12).
- Uddin, M. Z., Samad, M. A. and Kabir, S. M. L. (2011). Mortality and disease status in hy-line and isa-brown strains of layer chickens reared in cage system in Bangladesh. *Bangl. J. Vet. Med*, 9(1): 1-16.
- Yadav, C. M. and Bhimawat, B. S. (2020). Growth performance of Kadaknath poultry of tribal farmers in Bhilwara district of Rajasthan. *Indian Res. J. Ext. Edu.*, 20 (2&3): 1-3.

How to cite this article: Rajat Buragohain (2022). A Study on Nutritional Status and Performance of Broilers under Backyard Management for Nutritional Intervention and Profitable Farming in Mizoram. *Biological Forum – An International Journal*, 14(4): 562-566.