*Biological Forum – An International Journal* **16(7): 324-329(2024)**

**ISSN No. (Print): 0975-1130**
**ISSN No. (Online): 2249-3239**

# To Assess the effect of Feeding Amla Powder on Feed Intake and Nutrient Utilization in Broiler Chicks

***Pradeep Nodal[1*], Siddhartha Mishra[2], Lokesh Gupta[3], Goatm Chopra[4] and Jhabar Mal Tetarwal[5]***

*[1]Research Scholar, LPM Department of Animal Production, Rajasthan College of Agriculture, MPUAT Udaipur (Rajasthan), India.*
*[2]Professor, Department of Animal Production, Rajasthan College of Agriculture, MPUAT Udaipur (Rajasthan), India.*
*[3]Associate Professor, Department of Animal Production, Rajasthan College of Agriculture, MPUAT Udaipur (Rajasthan), India.*
*[4]STO (Senior Technical Officer), Livestock production and Management CSWRI Malpura Tonk (Rajasthan), India.*
*[5]SMS (Subject Matter Specialist), Livestock Production and Management CAZRI-KVK Pali (Rajasthan), India.*

*(Corresponding author: Pradeep Nodal*)*
*(Received: 04 May 2024; Revised: 20 May 2024; Accepted: 19 June 2024; Published: 15 July 2024)*
*(Published by Research Trend)*

**ABSTRACT: An experiment was conducted at poultry farm, department of Animal Production, Rajasthan College of Agriculture, Udaipur. The study was conducted to investigate the effect of feeding amla (*Emblica officinalis*) powder on performance and carcass characteristics of broiler chicks. A total of 160-day-old vaccinated broiler chicks (coloured broiler) were randomly divided into four treatment groups with four replicates of 10 chicks each. The feed intake expressed as g/chick/day or g /bird/week was studied during the experiment. The overall feed intake was significantly higher (P<0.05) in T2 followed by T1, T3 and T4. The weekly feed intake increased with supplementation of Amla powder at different levels in the present study. Similar, observations were also recorded. The perusal of data revealed that the nutrient utilization was significantly higher in T3 (Amla powder @1.0%) and lowest in control group as compared to rest of treatments support our findings as they have recorded significantly higher dry matter metabolites when supplemented with amla powder @ 0.75 and 1% as compared to all other dietary treatments. have also reported that the supplementation of amla powder @ 0.75% (70.60) and 1% (70.75) amla powder resulted in significantly (P<0.05) higher dry matter metabolizable among all different dietary treatments. Nitrogen metabolizable ranged 64.84% to 70.08% and significantly higher in 0.75% and 1% amla fruit powder supplemented group as compared to control and antibiotic supplemented group It has found that broilers fed with 200mg/kg herbal Vitamin-C showed significant increase in body weight and FCR, dry matter digestibility and $N_2$ retention.**

**Keywords:** Metabolizable, amla powder, chicks.

## INTRODUCTION

Poultry sector contributes to the tune of 1% in national GDP of livestock (14% GDP). The growth potential of poultry sector is bright attributed to the constant flow of income annually in the rural economy of India (Asmitha *et al.,* 2022). Though the term poultry includes wide range of species, however, the Indian poultry industry mainly revolves around the chicken due to low investment and quick returns (Shivaji, 2012). In both rural as well as urban areas irrespective of culture and region, chicken production has significant contribution in terms of protein source, food security, employment generation, and income in resource-constrained communities (Ngongolo *et. al.,* 2019). In 2020, the global chicken population was over 33 billion birds with 46 percent of contribution from Asian countries (FAO, 2023). In 2022, the figures of Indian poultry market reached a value of USD 28.18 billion and annual growth rate of 8.1% as out predicted in next 5 years, making it USD 44.97 billion by 2028. Broiler production dominates the sector, with contribution of nearly 90% of the total output (Anonymous, 2023).

India ranks 3rd in egg production and 5th in meat production in world. In 2021-22, the total egg production in the country was 129.60 billion no's which has increased by 6.19% as compared to previous year. The total meat production in the country was 9.29 million tonnes for the year 2021-22 with an annual growth rate of 5.62% (Ministry of Fisheries, Animal Husbandry & Dairying 2023).

Amla or Indian Gooseberry (*Emblica officinalis*), with its origin in India has extensive adaptability to grow in diverse climatic and soil conditions (Pokharkar, 2005). The fruits of the plants have early history of use in Ayurveda as a potent rasayana (revitalisers, biological response modifiers) in which the amla was added as anti-stress agent. Amla is one of the richest sources of ascorbic acid, minerals, amino acids, tannins, and phenolic compounds. Amla, richest source of vitamin-C and it's active tannoid principles have antimicrobial,

antidiabetics, anticarcinogenic properties and enhances immune property (Anjaria *et al.,* 2002). It is a great nutritional supplement with several medicinal benefits. Due to the abundance of phenolic compounds, Emblic fruit could be regarded as a plant source for natural antioxidants and nutraceuticals or medicinal components. In various animal and human investigations, amla has been proven to have anti-hyperglycaemic, hypoglycaemic, anti-inflammatory, anti-hyperlipidaemic, and antioxidant activity that helps the body's immune systems and digestion (Gul *et al.,* 2022).

## MATERIAL AND METHODS

**Location.** The experiment was conducted at Poultry farm, Department of Animal Production, Rajasthan College of Agriculture, MPUAT Udaipur, located in humid region at 24.35 North and Longitude of 74.42 East with height from the mean sea level 582.2 Meter.

**Feed intake.** The feed intake was measured in each treatment group on two consecutive days at weekly interval. Total feed offered and residue thereof was weighed to obtain feed intake.

Feed intake (g) = Feed offered during the current day (g) – Feed leftover at the next day (g)

**(A) Feed conversion ratio (FCR).** Feed conversion ratio was estimated at weekly interval as well as for the entire growth period i.e., from 1 to 8 week of age. Feed conversion ratio were calculated by using following formula.

Feed Conversion Ratio =

$$\frac{\text{Weekly feed consumption per bird per week (g)}}{\text{Weekly weight gain per bird per week (g)}}$$

**(B) Nutrient Utilization**

**i. Determination of dry matter**

Feed sample was taken through metabolic trial and taken pre-weight petri dish and kept in hot air oven at 100°C for 24 hours. Weight of petri dish with dry sample taken after 24 hours. Dry matter was calculated using the following formula:

$$\text{Dry matter (\%)} = \frac{b}{a} \times 100$$

Where,

a = Fresh weight of sample (g)

b = Weight of sample after oven dry (g)

Moisture (%) = 100 – Dry matter (%)

**ii. Determination of total nitrogen and crude protein**

The crude protein was determined by Kjeldahl method (AOAC, 2005). Three steps were followed by using Kjeldahl method in following sequence:

**Digestion:**

About 0.2g of sample was taken in a flask and addition of 4g of digestion mixture of $k_2SO_4$: $CuSO_4$ in 5:1 ratio and 10ml concentrated of $H_2SO_4$. The content was digested at 400°C for 1.5-2 hours until the green/ blue transparent liquid was obtained. Cooling the volume of digest sample with 30ml distilled water.

**iii. Determination of total Ash.** For the determination of ash percentage 5 g sample was taken in pre-weighted silica crucible. The crucible with sample was kept on heater and burn till no more smoke was given off by burn mass of sample. Thereafter, the silica crucible containing charred mass of feed sample was transferred into muffle furnace with help of mental tong and inflame at 600°C for 2 hours, the crucible containing ash was removed from the muffle furnace and then transferred into desiccators, cooled and weighted. Total ash was calculated by following formula:

$$\text{Total ash (\%) on dry matter basis} = \frac{a - b}{c} \times 100$$

Where,

a = weight of silica crucible with ash (g)

b = weight of empty silica crucible (g)

c = weight of sample taken for ashing on dry matter basis (g)

**iv. Determination of ether extract**

Soxhlet method was used for the determination of ether extract. In this method 2g dry and crushed sample was transferred into thimble and taken weight of empty oil flask. Thimble was placed in Soxhlet's apparatus and refluxed with petroleum ether for eight hours in straight position. Petroleum ether (boiling point 40-60°C) used as a solvent for the evaporation. After eight hours thimble was taken out the oil flask containing ether extract was put on hot air oven for evaporation of ether, after removed from hot air oven, and keep for cooling and desiccated area and taken weight. Ether was calculated used following formula:

$$\text{Ether extract (\%)} = \frac{b}{a} \times 100$$

Where,

a = weight of sample

b = (weight of oil flask after extraction) – (weight of oil flask before extraction)

**Determination of Crude Fiber.** The dry weight sample after de-Ethering was taken from spout less beaker of 1 liter capacity and add in beaker, 200 ml of 1.25% $H_2SO_4$. It was refluxed for 30 minutes on hot plate after the boiling started and thereafter, filtered through muslin cloth. The acid free the residue was washed 5-6 minutes with hot water. The residual material on the muslin cloth was again transferred to beaker and in beaker 200 ml of 1.25% NaOH solution was added. Free from alkali after the boiling started it was again refluxed for 30 min and thereafter filtered through muslin cloth washed with hot water for 5-6 times. Thereafter, total residue was transferred in a clean, dry silica crucible and dried in hot air oven at 100°C for 24 hours. Then it was cooled in desiccator and taken weight. The residue was then burning in muffle oven at 600°C for 2 hours. After 12 hours silica crucible containing ash was removed from the oven and transferred into desiccator, cooled and taken weight again. Weight loss during inflame was recorded as the weight of crude Fiber. Crude Fiber was calculated used following formula:

$$\text{Crude Fiber (\%) on dry matter basis} = \frac{a - c}{a} \times 100$$

Where,

a = weight of sample on dry matter basis (g)

b = weight of silica crucible before burning (g)

c = weight of silica crucible containing residue after burning (g)

**vi. NFE (Nitrogen free extract).** Nitrogen free extract in feed and faeces was calculated using following formula:

$$NFE = 100 - (CP+CF+ASH+EE+moisture\%)$$

**vii Digestibility of nutrients.** During the end of metabolic trial analysis of feed and faeces sample data was taken from all 6 treatments of experiments. For the digestibility percentage of nutrient analysis according to standard method and the results were calculated by using following formula:

$$\text{Digestibility percentage} = \frac{\text{Nutrient in feed - Nutrient in faeces}}{\text{Nutrient in feed}} \times 100$$

**viii. Metabolizable Energy.** The gross energy of the dried and ground sample of feed ingredients and excreta were determined using adiabatic bomb calorimeter. The classical ME values of assay diets were determined by total collection method (Sibbald and Slinger 1962)

$$\text{ME Kcal/kg} = \frac{\text{GE in feed - GE in excreta}}{\text{DM Intake (g)}} \times 1000$$

**(C) Carcass Traits.** Four birds from each treatment were sacrificed at the end of experiment to evaluate the carcass characteristics. Carcass traits viz., live weight percentage, dressed weight percentage; eviscerated weight and giblet weight were calculated.

**(i) Live weight (g).** Live weight of individual chicks was recorded before slaughtering of turkey poults. It was measure by the electrical weight machine.

**(ii) Dressed weight percentage**

$$\text{Dressing weight} = \frac{\text{Live weight – weight of blood, feathers, shank and head}}{\text{Live weight (g)}} \times 100$$

**(iii) Eviscerated weight percentage**

$$\text{Eviscerated weight (\%)} = \frac{\text{Dressed weight - weight of viscera except giblet}}{\text{Live weight}} \times 100$$

**(iv) Giblet weight.** For the giblet weight combined weight taken of heart, liver and gizzard after cut of abdomen and measure by electrical weight machine.

## RESULT AND DISCUSSION

**Weekly Feed Intake.** The data with respect to cumulative weekly feed intake per bird is presented in Table 1.

The mean weekly feed intake during first week was 74.39±0.35, 82.37±0.11, 78.65±0.15 and 69.83±0.15 g in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that the weekly feed intake was significantly highest in T2 followed by T3, T1 and T4.

The mean weekly feed intake at 5$^{th}$ week of age 465.83±0.95, 491.54±0.87, 401.99±1.09 and 375.17±1.25 g in T1, T2, T3 and T4 groups respectively. The data revealed that the mean weekly feed intake was significantly highest (P<0.01) in T2 followed by T1, T3 and lowest in T4.

At 6$^{th}$ weeks of age, the mean weekly feed intake was found to be 563.89±1.22, 600.90±0.71, 526.82±0.59 and 496.28±0.75 g in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that the mean feed intake was significantly highest (P<0.01) in T2 followed by T1, T3 and lowest in T4.

The mean weekly feed intake at 7$^{th}$ week of age was 586.27±1.36, 622.84±2.05, 511.63±1.52 and 486.29±1.04 g respectively in T1, T2, T3 and T4 groups respectively. It was found that the weekly feed intake was significantly highest (P<0.01) in T2 followed by T1, T3 and lowest in T4.

The weekly feed intake during 8$^{th}$ weeks of age was 679.67±1.10, 671.70±2.25, 657.91±1.10 and 601.41±0.49 g respectively in T1, T2, T3 and T4 groups. The perusal of data revealed that the weekly feed intake was significantly highest (P<0.01) T1 followed by T2, T3 and lowest in T4.

The total feed intake (g/bird) up to 8$^{th}$ week was 3193.30±3.21, 3335.52±5.78, 2946.39±3.96 and 2792.81±3.63 g respectively in T1, T2, T3 and T4 groups. Cumulative feed intake per bird was significantly highest (P<0.01) in T2 followed by T1, T3 and lowest in T4.

**Ingredients Composition of Ration.**

| Feed ingredients | Treatments (%) | | | |
|---|---|---|---|---|
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ |
| Maize | 49.5 | 49.5 | 49 | 49 |
| Soya cake | 38 | 38 | 38.5 | 38.5 |
| DORB | 12.5 | 12 | 11.5 | 11 |
| Amla powder | 0 | 0.5 | 1 | 1.5 |
| Total | 100 | 100 | 100 | 100 |
| **Nutrient Composition** | | | | |
| Moisture (%) | 6.88 | 6.95 | 6.55 | 6.21 |
| Dry matter (%) | 93.12 | 93.05 | 93.45 | 93.79 |
| Crude protein (%) | 23.05 | 23.01 | 22.98 | 23.10 |
| Total Ash (%) | 5.34 | 5.31 | 5.33 | 5.26 |
| Total Ether (%) | 2.83 | 2.83 | 2.82 | 2.82 |
| Crude Fiber (%) | 5.43 | 5.45 | 5.53 | 5.51 |
| Nitrogen Free extract | 38.06 | 38.14 | 38.21 | 38.09 |
| Metabolizable energy (Kcal/kg) | 2834 | 2834 | 2827 | 2830 |

**Feed Conversion Ratio (FCR).** The weekly mean feed conversion ratio (FCR) in birds fed diets supplemented with different levels of amla powder is presented in Table 2. The mean FCR at first week of age was 1.75±0.04, 1.73±0.02, 1.56±0.02 and 1.64±0.02 in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that mean FCR was significantly highest (P<0.01) in T1 and T2 as compared to T3 and T4. However, the difference between T1 and T2 was found to be non-significant.

The mean FCR at 2nd week of age 2.30±0.03, 1.99±0.05, 1.58±0.03 and 1.96±0.03 in T1, T2, T3 and T4 respectively. The perusal of data revealed that the mean FCR was significantly highest (P<0.01) in T1 followed by T2 and T4 and lowest in T3. However, the difference between T2 and T4 was found to be non-significant.

The weekly mean FCR at 6th week of age was 2.21±0.07, 1.97±0.02, 1.70±0.06 and 1.65c±0.04 in T1, T2, T3 and T4 groups respectively. It was found from the perusal of data that the mean FCR was significantly highest (P<0.01) T1 followed by the T2 lowest in T3 and T4 while the difference between T3 and T4 was found to be non-significant.

The mean FCR at 7th weeks of age was 1.95±0.04, 1.86±0.04, 1.50±0.02 and 1.52±0.07 in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that the FCR was significantly highest (P<0.01) in T1 and T2, as compared to T4 and T3. However, the difference between T1 and T2 and between T3 and T4 were found to be non-significant.

The mean FCR at 8th weeks of age was 1.77±0.02, 1.87±0.07, 1.51±0.03 and 1.63±0.04 in T1, T2, T3 and T4 respectively. The perusal of data revealed that the FCR was significantly highest (P<0.01) in T2 and T1 followed by T4 and lowest in T3. However, the difference between T2 and T1 was found to be non-significant

The overall FCR was 1.98±0.02, 1.83±0.02, 1.51±0.01 and 1.65±0.02 in T1, T2, T3 and T4 groups respectively. The mean overall FCR was significantly improved (P<0.01) in T3 followed by T4, T2 and poorer FCR was found in T1.

**Nutrient Intake and Digestibility.** A metabolism trial was conducted at the end of the feeding trial after 8th weeks of age. The data pertaining to nutrient intake and utilization is presented in Table 3.

The dry matter intake (g/bird/day) was 97.60±1.15, 97.35±1.04, 98.68±0.52 and 95.21±0.42 g in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that mean dry matter intake was significantly lower (P<0.01) in T4 as compared to rest of the groups with did not differ significantly.

The mean digestible dry matter intakes were 68.67±1.09, 71.72±0.26, 70.17±2.80 and 68.13±0.68 in $T_1$, $T_2$, $T_3$ and $T_4$ groups respectively. The difference in mean digestible dry matter intake amongst different groups was found to be small and statistically non-significant.

The mean digestibility coefficients of dry matter were 70.35±0.94, 73.71±0.84, 71.06±2.67 and 71.56±1.00 in $T_1$, $T_2$, $T_3$ and $T_4$ groups respectively. The difference in dry matter digestibility amongst different groups was found to be statistically non-significant.

The mean crude protein intakes (g/bird/day) were 21.63±0.26, 21.52±0.23, 21.79±0.11 and 20.98±0.09 in T1, T2, T3 and T4 groups respectively. The crude protein intake followed the similar trend as observed for dry matter intake being significantly higher (P<0.01) in T1, T2 and T3 as compared T4, While the difference among T1, T2 and T3 was non-significantly.

The mean digestible crude protein intakes were 16.13±0.23, 16.91±0.06, 17.62±0.22 and 17.08±0.07 g in T1, T2, T3 and T4 groups respectively. The data revealed that the mean digestible CPI intake was significantly higher (P<0.01) in T3 followed by T4, T2 and lowest T1. The difference between T2 and T4 was found to be non-significant.

The mean digestible coefficients of crude protein were 74.58±0.81, 78.59±0.68, 80.88±0.87 and 81.40±0.55 in T1, T2, T3 and T4 treatment groups respectively. It was observed that the difference in digestibility coefficients of crude protein was significantly higher (P<0.01) in T4 and T3 as compared to T2 and control (T1) group. However, the difference between T3 and T4 was found to be non-significant.

The mean CF intakes were 5.18±0.06, 5.19±0.06, 5.34±0.03 and 5.17±0.02 in T1, T2, T3 and T4 groups respectively. The keen perusal of data revealed that the mean CF intake was significantly higher (P<0.01) in T3 as compared to rest of the treatment groups. Which did not differ among themselves.

The mean digestible CF intakes were 3.52±0.06, 3.87±0.01, 3.92±0.14 and 3.61±0.04 g respectively in T1, T2, T3 and T4 groups. It was found that the mean digestible CF intake was significantly higher (P<0.01) in T3, T2 and T4 as compared to control (T1) group whereas the difference amongst T1 and T4 were was found to be non-significant.

The mean digestibility coefficients of crude fibre were 67.84±1.02, 74.59±0.81, 73.47±2.45 and 69.83±1.07 % in T1, T2, T3 and T4 groups respectively. From the perusal of data, it was found that the mean digestibility coefficient of CF was significantly higher (P<0.01) in T2, T3 and T4 as compared toT4 and T1 while the values observed in T3 did not the digestibility coefficient in T4 did not differ with T1 and T3.

The mean EE intakes were 2.74±0.03, 2.74±0.03, 2.76±0.02 and 2.67±0.01 g in T1, T2, T3 and T4 groups respectively. The perusal of data revealed that the mean EE intake was significantly lower (P<0.01) in T4 as compared to rest of the groups. While the difference in values observed in T1, T2 and T3 were found to be statistically non-significant.

The nitrogen intake and balance in different treatment groups as influenced by supplementation of amla powder is presented in Table 3. The nitrogen intakes in different groups were 3.46±0.04, 3.44±0.04, 3.49±0.02 and 3.36±0.02 g in T1, T2, T3 and T4 respectively. It was found from the perusal of data that the nitrogen intake was significantly (P<0.01) higher in $T_1$, $T_2$ and $T_3$ as compared to T4 while the value in T3, $T_1$ and $T_2$ did not differ significantly amongst treatments.

The nitrogen balances were 2.71±0.08, 2.70±0.07, 2.76±0.06 and 2.68±0.13 g in $T_1$, $T_2$, $T_3$ and $T_4$ groups

respectively. The perusal of data revealed that the nitrogen balance tends to be slightly higher in $T_3$ as compared to rest of the treatment groups, however, the difference was found to be non-significant.

**Table 1: Effect of supplementation of amla powder on weekly feed intake (g/chick) in broiler chicks.**

| Age (Week) | T1 | T2 | T3 | T4 | SEm | CD |
|---|---|---|---|---|---|---|
| 1 | 74.39$^{c}$±0.35 | 82.37$^{a}$±0.11 | 78.65$^{b}$±0.15 | 69.83$^{d}$±0.15 | 0.23 | 0.72** |
| 2 | 208.13$^{b}$±0.28 | 227.10$^{a}$±0.80 | 210.65$^{b}$±3.05 | 207.62$^{b}$±0.67 | 1.08 | 3.33** |
| 3 | 244.56$^{b}$±0.50 | 247.56$^{a}$±0.44 | 245.35$^{b}$±0.38 | 231.44$^{c}$±0.42 | 0.32 | 0.97** |
| 4 | 370.56$^{b}$±2.74 | 391.51$^{a}$±0.62 | 313.39$^{d}$±1.42 | 324.78$^{c}$±1.64 | 0.58 | 1.79** |
| 5 | 465.83$^{b}$±0.95 | 491.54$^{a}$±0.87 | 401.99$^{c}$±1.09 | 375.17$^{d}$±1.25 | 0.86 | 2.65** |
| 6 | 563.89$^{b}$±1.22 | 600.90$^{a}$±0.71 | 526.82$^{c}$±0.59 | 496.28$^{d}$±0.75 | 0.77 | 2.36** |
| 7 | 586.27$^{b}$±1.36 | 622.84$^{a}$±2.05 | 511.63$^{c}$±1.52 | 486.29$^{d}$±1.04 | 0.74 | 2.27** |
| 8 | 679.67$^{a}$±1.10 | 671.70$^{b}$±2.25 | 657.91$^{c}$±1.10 | 601.41$^{d}$±0.49 | 0.90 | 2.78** |
| Total feed intake | 3193.30$^{b}$±3.21 | 3335.52$^{a}$±5.78 | 2946.39$^{c}$±3.96 | 2792.81$^{d}$±3.63 | 1.83 | 5.63** |

**Table 2: Effect of supplementation of amla powder on feed conversion ratio (FCR) in broiler chicks.**

| Age (Week) | T1 | T2 | T3 | T4 | SEm | CD |
|---|---|---|---|---|---|---|
| **1** | 1.75$^{a}$±0.04 | 1.73$^{a}$±0.02 | 1.56$^{b}$±0.02 | 1.64$^{c}$±0.02 | 0.02 | 0.06** |
| **2** | 2.30$^{a}$±0.03 | 1.99$^{b}$±0.05 | 1.58$^{c}$±0.03 | 1.96$^{b}$±0.03 | 0.03 | 0.11** |
| **3** | 2.14$^{a}$±0.05 | 1.70$^{c}$±0.04 | 1.58$^{d}$±0.03 | 1.85$^{b}$±0.06 | 0.04 | 0.11** |
| **4** | 1.81$^{a}$±0.03 | 1.70$^{b}$±0.04 | 1.28$^{c}$±0.04 | 1.62$^{d}$±0.04 | 0.03 | 0.10** |
| **5** | 1.90$^{a}$±0.02 | 1082$^{a}$±0.04 | 1.41$^{b}$±0.03 | 1.36$^{b}$±0.05 | 0.03 | 0.09** |
| **6** | 2.21$^{a}$±0.07 | 1.97$^{b}$±0.02 | 1.70$^{c}$±0.06 | 1.65$^{c}$±0.04 | 0.04 | 0.13** |
| **7** | 1.95$^{a}$±0.04 | 1.86$^{a}$±0.04 | 1.50$^{b}$±0.02 | 1.52$^{b}$±0.07 | 0.03 | 0.10** |
| **8** | 1.77$^{a}$±0.02 | 1.87$^{a}$±0.07 | 1.51$^{c}$±0.03 | 1.63$^{b}$±0.04 | 0.04 | 0.11** |
| **Over all** | 1.98$^{a}$±0.02 | 1.83$^{b}$±0.02 | 1.51$^{d}$±0.01 | 1.65$^{c}$±0.02 | 0.01 | 0.04** |

**Table 3: Effect of supplementation of amla powder on nutrient intake and digestibility in broiler chicks.**

| Nutrient Intake and Digestibility Coefficient | | | | | | |
|---|---|---|---|---|---|---|
| | **T1** | **T2** | **T3** | **T4** | **SEm** | **CD** |
| **Dry Matter Intake (g/bird/day)** | 97.60$^{a}$±1.15 | 97.35$^{a}$±1.04 | 98.68$^{a}$±0.52 | 95.21$^{b}$±0.42 | 0.56 | 1.72** |
| **Digestible DMI (g/bird/day)** | 68.67±1.09 | 71.72±0.26 | 70.17±2.80 | 68.13±0.68 | 1.23 | NS |
| **Crude protein intake (g/bird/day)** | 21.63$^{a}$±0.26 | 21.52$^{a}$±0.23 | 21.79$^{a}$±0.11 | 20.98$^{b}$±0.09 | 0.12 | 0.38** |
| **Digestible CPI (g/bird/day)** | 16.13$^{c}$±0.23 | 16.91$^{b}$±0.06 | 17.62$^{a}$±0.22 | 17.08$^{b}$±0.07 | 0.13 | 0.41** |
| **CFI (g/bird/day)** | 5.18$^{b}$±0.06 | 5.19$^{b}$±0.06 | 5.34$^{a}$±0.03 | 5.17$^{b}$±0.02 | 0.03 | 0.09** |
| **Digestible crude fibre (g/bird/day)** | 3.52$^{b}$±0.06 | 3.87$^{a}$±0.01 | 3.92$^{a}$±0.14 | 3.61$^{b}$±0.04 | 0.06 | 0.19** |
| **Ether extract intake (g/bird/day)** | 2.74$^{a}$±0.03 | 2.74$^{a}$±0.03 | 2.76$^{a}$±0.02 | 2.67$^{b}$±0.01 | 0.02 | 0.05** |
| **Digestible EE (g/bird/day)** | 2.03±0.03 | 2.10±0.01 | 2.06±0.07 | 2.00±0.02 | 0.03 | NS |
| **NFE Intake (g/bird/day)** | 61.01$^{a}$±0.72 | 60.91$^{a}$±0.65 | 61.62$^{a}$±0.32 | 59.55$^{b}$±0.26 | 0.35 | 1.07** |
| **Digestible NFE intake (g/bird/day)** | 46.93$^{a}$±0.63 | 48.44$^{a}$±0.18 | 47.76$^{a}$±1.40 | 44.54$^{b}$±0.35 | 0.61 | 1.88** |
| **Gross energy intake (Kcal/bird/day)** | 271.70$^{a}$±3.19 | 270.97$^{a}$±2.89 | 274.03$^{a}$±1.44 | 264.40$^{b}$±1.16 | 1.55 | 4.78** |
| **GE balance (Kcal/bird/day)** | 192.79±4.53 | 199.60±1.46 | 198.96±9.33 | 199.14±2.62 | 3.20 | NS |
| | T1 | T2 | T3 | T4 | SEm | CD |
| **Nitrogen intake (g/bird/day)** | 3.46a±0.04 | 3.44a±0.04 | 3.49a±0.02 | 3.36b±0.02 | 0.02 | 0.06** |
| **Nitrogen balance (g/bird/day)** | 2.71±0.08 | 2.70±0.07 | 2.76±0.06 | 2.68±0.13 | 0.03 | NS |
| **Digestibility Coefficient** | | | | | | |
| **DM digestible coefficient (%)** | 70.35±0.94 | 73.71±0.84 | 71.06±2.67 | 71.56±1.00 | 1.29 | NS |
| **CP digestible coefficient (%)** | 74.58$^{c}$±0.81 | 78.59$^{b}$±0.68 | 80.88$^{a}$±0.87 | 81.40$^{a}$±0.55 | 0.72 | 2.22** |
| **CF digestibility coefficient (%)** | 67.84$^{c}$±1.02 | 74.59$^{a}$±0.81 | 73.47$^{ab}$±2.45 | 69.83$^{bc}$±1.07 | 1.21 | 3.73** |
| **EE digestibility coefficient (%)** | 74.04±0.82 | 76.98±0.73 | 74.57±2.35 | 75.01±0.89 | 1.13 | NS |
| **NFE digestibility coefficient (%)** | 76.93$^{bc}$±0.73 | 79.55$^{a}$±0.14 | 77.46$^{ab}$±2.08 | 74.79$^{c}$±0.89 | 0.74 | 2.27** |

The overall FCR was significantly lowest (P<0.01) in $T_1$ followed by $T_2$ and $T_4$ and highest in T3 indicating that the supplementation of amla powder has improved feed conversation efficiency as compared to control where no supplementation was done. The supplementation of vit-E @200mg per kg feed, amla, electrolyte and mint (*Mentha longifolia*) @ 10g per kg and 30g per kg feed; Nakajothi *et al.* (2009) on feeding *Emblica officinalis* fruit @ 5, 10 or 20 g amla dry powder or 250 mg synthetic vitamin C /kg; Nakajothi *et al.* (2009) on feeding broilers with amla, Tulsi and turmeric @ 0.25 and 0.5 per cent levels and Kumar *et al.* (2013) on diet supplementation with 1% amla+0.05% multi-enzyme have also observed that the feed conversation ratio was improved with supplementation of amla powder.

Studies by Naik *et al.* (2020) also positively correlates with our findings as they recorded that supplementation of amla fruit powder @0.5% level enhances the FCR in broiler chickens without any adverse effect and at 1% and 2% level of inclusion. The perusal of data revealed that the nutrient utilization was significantly higher in $T_3$ (Amla powder @1.0%) and lowest in control group as compared to rest of treatments. Dalal *et al.* (2018) support our findings as they have recorded significantly higher dry matter meltability when supplemented with amla powder @ 0.75 and 1% as compared to all other dietary treatments.

Dalal *et al.* (2018) have also reported that the supplementation of amla powder @ 0.75% (70.60) and 1% (70.75) amla powder resulted in significantly (P<0.05) higher dry matter metabolizable among all different dietary treatments. Nitrogen metabolizable ranged 64.84% to 70.08% and significantly higher in 0.75% and 1% amla fruit powder supplemented group as compared to control and antibiotic supplemented group. Dhore *et al.* (2014) have found that broilers fed with 200mg/kg herbal Vitamin-C showed significant increase in body weight and FCR, dry matter digestibility and $N_2$ retention.

## CONCLUSIONS

Diet supplementation with 1% amla+0.05% multi-enzyme has also observed that the feed conversation ratio was improved with supplementation of amla powder. Support our findings as they have recorded significantly higher dry matter metabolite when supplemented with amla powder @ 0.75 and 1% as compared to all other dietary treatments. That broilers fed with 200mg/kg herbal Vitamin-C showed significant increase in body weight and FCR, dry matter digestibility and $N_2$ retention.

**Acknowledgement.** Authors have deep regards towards Dean, RCA Udaipur and Head of Department, department of animal production for providing all the necessary facilities for conducting this experiment.

## REFERENCES

Anjaria, J., Parabiam, M. and Dwivedi, S. (2002). Ethnovet Heritage. Ahmedabad (1st Ed.), Prathik Enterprises, 45.

Asmitha, S., Abinaya, S. and Akhila, C. (2022). Role of Poultry in Nation Building. Pashudhan Praharee. https://www.pashudhanpraharee.com/role-of-poultry-in-nation-building.

Anonymous (2023). Shaping the Future of the Indian Poultry Industry in the New Decade. https://www.theindustryoutlook.com/services-and-consulting/ indu stry-experts/shaping-the-future-of-the-indian-poultry-industry-in-the-new- decade-nwid-4096.html

Dhore, R. N., Tangade, S. U. and Dhok, A. P. (2014). Effect of herbal and synthetic vitamin C supplementation on performance of broilers under intense summer conditions. *Indian Journal of Poultry Science*, *49*(1), 48-51.

Dalal, R., Panwar, V. S., Ahlawat, P. K., Tewatia, B. S. and Sheoran, N. (2018). Effect of supplementation of amla (*Emblica officinalis*) fruit powder on growth performance during different growth phases of broiler chicken. *Journal of Animal Research*, *8*(4), 621-628.

FAO (2023). Gateway to poultry production and products: Chickens. https://www.fao.org/poultry-production-products/production/poultryspecies/ chickens/en/

Gul, M., Liu, Z. W., Iahtisham-Ul-Haq, Rabail, R., Faheem, F., Walayat, N., Nawaz, A., Shabbir, M. A., Munekata, P. E. S., Lorenzo, J. M. and Aadil, R. M. (2022). Functional and nutraceutical significance of amla (*Phyllanthus emblica* L.): A review. *Antioxidants*, *11*(5), 816-821.

Kumar, M., Sharma, R.K., Chaudhari, M. and Jakhar, A. (2013). Effect of Indian gooseberry and multienzyme supplementation on the performance of broilers during hot weather. *Haryana Veterinarian*, *52,* 66-68.

Nakajothi, N., Nanjappan, K., Selvaraj, P., Jayachandran, S. and Visha, P. (2009). Production performance and blood biochemical changes in broiler chickens fed amla during induced stress conditions. *Indian Journal of Animal Sciences*, *79*(11), 1124-1126.

Ngongolo, K., Sigala, E. and Mtoka, S. (2019). Community poultry project for conserving the wildlife species in Magombera Forest, Tanzania. *Asian Research Journal of Agriculture, 2,* 1–7.

Naik, B., Behera, K., Babu, L. K., Sethy, K., Nanda, S.M. and Pradhan, P. K. (2020). Effects of supplementation of amla (*Emblica officinalis*) fruit powder meal on growth performance in broiler chickens. *International Journal of Current Microbiology and Applied Sciences*, *9*(2), 2805-2811.

Pokharkar, S. M. (2005). Development and performance evaluation of aonla shredding machine. *Beverage Food World, 32*(3), 52–53.

Shivaji, S. P. (2012). Influence of *Emblica officinalis* (Amla) on nutrient utilization and carcass quality of broilers reared under nutritional stress. M.V.Sc. Thesis, Animal and Fishery Science University, Maharashtra, India.

Sibbald, I. R., and S. J. Slinger, (1962). Factors affecting the metabolizable energy content of poultry feeds. 10. A study of the effect of level of dietary inclusion on the metabolizable energy values of several high protein feedings tuffs. *Poultry Sci., 41,* 1282-1289.

**How to cite this article:** Pradeep Nodal, Siddhartha Mishra, Lokesh Gupta, Goatm Chopra, Subhash Yadav and Jhabar Mal Tetarwal (2024). To Assess the effect of Feeding Amla Powder on Feed Intake and Nutrient Utilization in Broiler Chicks. *Biological Forum – An International Journal, 16*(7): 324-329.