The Pharma Innovation Journal 2021; SP-10(2): 170-173

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(2): 170-173

www.thepharmajournal.com
Received: 11-12-2020
Accepted: 13-01-2021

Manojkumar Villavan
Division of Animal Nutrition, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India

Gopi Marappan
Division of Avian Physiology and Reproduction, ICAR-Central Avian Research Institute, Izatnagar, Uttar Pradesh, India

Jaydip Jaywant Rokade
Division of Avian Genetics And Breeding, ICAR-Central Avian Research Institute, Izatnagar, Uttar Pradesh, India

Shyam Kumar
Division of Veterinary Pharmacology and Toxicology, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India

Praveen V
Department of Physiology, Hebbal Veterinary College, Bengaluru, India

Natarajan A
Division of Animal Nutrition, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India

Corresponding Author
Manojkumar Villavan
Division of Animal Nutrition, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India

Effect of nucleotide through feed on body weight and blood biochemical parameters in broiler chickens

Manojkumar Villavan, Gopi Marappan, Jaydip Jaywant Rokade, Shyam Kumar, Praveen V and Natarajan A

Abstract
The present study on the effect of nucleotides in body weight and blood biochemical parameters was carried out**.** A total 240 chicks which belongs to the broiler breed CARIBRO VISHAL were used for this study. All the chicks were divided into 6 groups 40 birds in each. T1 served as Control. T2, T3, T4 and T5 groups were supplemented with Adenosine, Guanosine, Cytosine and Uridine @ 0.1% respectively. Group T6 was supplemented with combination of all four nucleoside (Adenosine, Guanosine, Cytosine and Uridine) bases each at 0.1%. The bases were administered through feed for initial 14d of age. The body weight of birds fed with combination of nucleosides was significantly (P<0.05) higher. The total protein level was significantly (P<0.05) higher in the plasma of birds supplemented with combination of nucleosides. It remained elevated in the group supplemented with combination of nucleosides after 14 and 42nd day. Plasma uric acid level was significantly elevated in nucleoside combination supplemented group compared to control and all individual nucleosides supplemented groups during except 42nd day of study. Thus present study concluded that supplementation of combined nucleosisdes significantly (P<0.05) increased body weight, Total protein and uric acid level in broilers.

Keywords: nucleosides, broiler chickens, body weight, total protein

I. Introduction
Nucleotides are low molecular weight and intracellular in nature. Nucleotides are the basic units that make up nucleic acids, such as deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), the molecular repositories of genetic information. They are required for almost all biochemical processes of life. Nucleotides involved in gut development and repair, heart function, immune response and skeletal muscle development [6]. They increase the development of the villi, intestinal wall thickness, protein content, and DNA and RNA contents [12] Apart from denova synthesis, tissues such as immune and intestinal mucosa cells requires more nucleotides due to their rapid proliferation rate [11]. The main form of absorption of nucleotide is nucleoside [3]. Thus, individual nucleosides and their combination were supplemented through feed and effects on body weight and blood biochemical parameter in broilers were studied.

2. Materials and Methods
The current experiment was carried out in ICARCentral Avian Research Institute, Bareilly. A total 240 chicks which belongs to the broiler breed CARIBRO VISHAL were used for this study. All the chicks were divided into 6 groups and 40 birds in each. T1 group served as control. T2, T3, T4 and T5 groups were supplemented with individual nucleoside Adenosine, Guanosine, Cytosine and T5 Uridine @0.1% respectively. T6 birds were supplemented with Combination of all four nucleoside (Adenosine, Guanosine, Cytosine and Uridine) bases each at 0.1%. The bases were administered through feed for initial 14d of age. After 14 days all the 6 groups were fed with standard diet (7) for the trial period upto 42d of age. Body weight of the chicks was measured on bi-weekly to assess the effect of nucleosides on the body weight gain in broilers. For biochemical parameters, blood sample was collected from wing vein and serum was separated by centrifuging at 2500g for 5 minutes. Total protein and uric acid was estimated in serum by biuret method using commercially available kit from coral clinical systems. Serum glucose level was estimated by GOD/POD method and cholesterol level by CHOD/PAP method using kit. Serum alkaline phosphatase was measured by Papp kinetic method and triglycerides by GPO/PAP method using kits. Serum SGPT (ALAT) and SGOT (ASAT) were measured using Reitman & Frankel's method.

All the kits were procured from coral clinical systems, tulip group.

2.1 Statistical analysis
The results were subjected to analysis of variance single factor using SPSS version 20.0 and the means were compared with Tukey's range test for significance ($P<0.05$).

3. Results and Discussion
3.1. Body weight
The results on body weight of broilers fed with individual and combination of nucleosides at different phases pre-starter (0-2weeks), starter (3-4 weeks) and finisher (5-6weeks of age) were presented in Table 1. The body weight of birds fed with combination of nucleosides was significantly ($P<0.05$) higher, followed by individual bases than control during starter and finisher period while no significant ($P>0.05$) change was observed during pre-starter stage.

Similar to our findings, [4] who supplemented 0.05% of a commercial nucleotide product (Nuceloforce, containing 26.4% of balanced total nucleotides) in broiler diets observed significant increase in body weight gain when compared with birds fed on the control diet from 0 to 21 d of age. Supplementation of 4.0% of yeast extract product (Nupro containing 7% of total nucleic acids) to pig diets increased the body weight gain [10]. In a study conducted by [9] supplementation of 2% Nupro to the diet significantly increased body weight gain as compared with the control diet. Nucleosides increases villi length of small intestine through rapid cell turnover which allows chicks to utilise nutrients more efficiently in their early life and improve growth performance [1]. Increased villus height has been correlated to increased performance due to improving nutrient absorption [8]. This increase in the body weight has been attributed to increase in the digestibility and absorption of nutrients which leads to increase in body weight.

3.2. Serum biochemistry
After 7 days, plasma calcium concentration was significantly higher in groups
supplemented with T4, T5 and T6 groups. Similar trend was also observed for plasma phosphorus levels. There was no significant change in the plasma glucose level in any groups. SGOT was reduced in all groups compared to control. After final slaughter on 42nd day, the plasma cholesterol level was significantly higher in groups fed with guanosine and nucleoside combination. Plasma triglycerides level showed no statistical difference. Plasma chloride level was significantly lower in the nucleosides combination supplemented group compared to other groups.

The total protein level was significantly ($P<0.05$) higher in the plasma of birds supplemented with combination of nucleosides. It remained elevated in the group supplemented with combination of nucleosides after 14 and 42 nd day. Intra peritoneal administration of nucleoside-nucleotide mixture increased small intestinal RNA levels in mice, which indicated an increased proliferation of enterocytes as compare to control group [13]. Nucleotides are known to facilitate protein synthesis by increasing the availability of precursors of RNA synthesis [5]. Thus nucleotides are important to increase body protein turnover rate, specific protein synthesis and enterocyte proliferation.

Plasma uric acid level was significantly elevated in nucleoside combination supplemented group compared to control and all individual nucleosides supplemented groups during except 42nd day of study. As the age increases, concentration of uric acid decreased. In birds, purine bases are degraded to uric acid. In addition, purine bases are formed from excess amino-N, which subsequently degraded to uric acid and excreted in urine [2].

Table 1: Effect of individual and combination of nucleosides feeding on body weight (g) in broiler chicks

Group	Hatch	Pre-starter	Starter	Finisher
I	45.38±0.76	326.47±6.43	917.31^{c}±19.55	1825.53^{c}±32.20
II	44.76±0.84	359.32±8.83	999.07^{b}±14.68	1923.79^{b}±36.37
III	42.86±1.04	328.53±10.17	935.67^{b}±10.49	1861.10^{c}±38.92
IV	43.95±0.89	331.79±12.64	961.87^{b}±14.43	1883.14^{c}±30.61
V	43.71±0.95	353.06±11.44	906.75^{b}±12.47	1854.79^{c}±38.64
VI	44.50±0.70	360.21±11.30	1013.36^{a}±11.04	2035.31^{a}±36.01
SEM	0.35	4.54	10.16	16.78
P-value	0.408	0.063	0.015	0.025

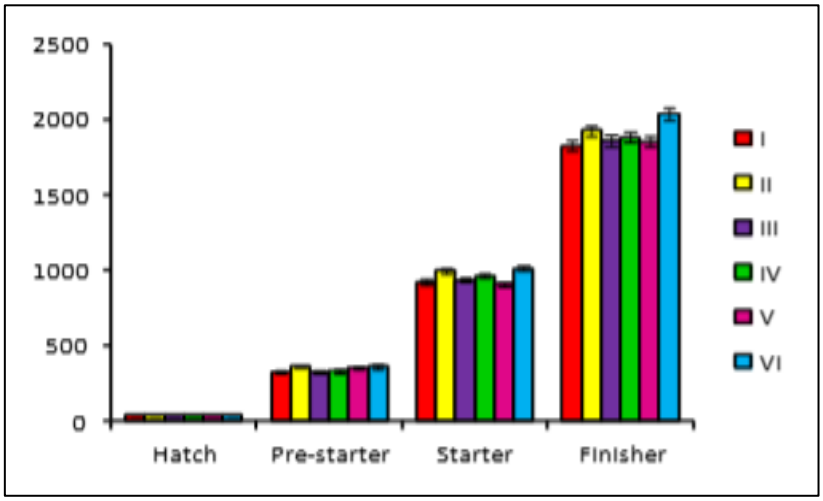

Fig 1: Effect of individual and combination of nucleosides feeding on body weight (g) in broiler chicks

Table 2. Effect of individual and combination of nucleosides feeding on plasma biochemistry in broiler chicks at 7d of age

Group	Calcium (mg/dl)	Phosphorus (mg/dl)	Glucose (mg/dl)	Total protein (g/dl)	SGOT (U/L)	Uric acid (mg/dl)
I	8.19^{b}±0.01	5.14^{b}±0.14	367.88±2.66	6.20^{cd}±0.31	164.75^{a}±4.98	4.13^{c}±0.63
II	8.62^{b}±0.01	5.50^{b}±0.10	373.97±3.91	6.14^{d}±0.30	156.47^{ab}±6.67	4.73^{c}±0.42
III	8.19^{b}±0.02	6.12^{ab}±0.28	377.18±5.29	7.15^{bc}±0.10	148.59^{abc}±7.60	7.74^{ab}±0.89
IV	10.73^{a}±0.08	6.63^{a}±0.27	373.80±8.24	6.71^{cd}±0.10	129.06^{bc}±9.75	4.85^{c}±0.20
V	10.64^{a}±0.15	6.88^{a}±0.32	394.53±4.92	7.89^{ab}±0.15	122.60^{c}±0.93	6.48^{bc}±0.14
VI	10.74^{a}±0.22	6.92^{a}±0.21	403.34±3.72	8.28^{a}±0.30	140.18^{abc}±5.51	8.53^{a}±0.81
SEM	0.21	0.15	4.62	0.16	3.50	0.40
P-value	0.001	0.001	0.178	0.001	0.001	0.001

Table 3: Effect of individual and combination of nucleosides feeding on plasma biochemistry in broiler chicks at 14d of age.

Group	Cholesterol (mg/dl)	Total protein (g/dl)	Uric acid (mg/dl)
I	130.60±7.71	5.86^{ab}±0.22	4.28^{b}±0.30
II	113.98±8.74	5.94^{ab}±0.23	5.03^{ab}±0.29
III	134.27±11.46	5.66^{b}±0.06	4.67^{b}±0.22
IV	119.39±14.80	6.40^{ab}±0.11	5.08^{ab}±0.20
V	110.93±5.48	6.14^{ab}±0.18	5.64^{ab}±0.45
VI	112.12±3.36	6.52^{a}±0.03	6.20^{a}±0.51
SEM	3.86	0.08	0.17
P-value	0.364	0.005	0.006

Table 4: Effect of individual and combination of nucleosides feeding on plasma biochemistry in broiler chicks at 42d of age

Group	Cholesterol (mg/dl)	Phosphorus (mg/dl)	Glucose (mg/dl)	Total protein (g/dl)	SGOT (U/L)	Triglycerides (mg/dl)	Uric acid (mg/dl)	Chloride (mg/dl)
I	87.46^{c} ±9.40	5.49^{b} ±0.57	332.50 ±14.17	7.34^{c} ±0.33	161.16^{a} ±6.27	79.88 ±6.91	1.97 ±0.14	108.33^{ab} ±2.43
II	92.54^{c} ±13.14	7.0^{ab} ±0.42	310.75 ±10.43	7.51^{c} ±0.27	156.47^{a} ±6.67	90.35 ±19.18	2.55 ±0.29	119.46^{a} ±5.38
III	142.67^{a} ±9.21	6.97^{ab} ±0.26	313.55 ±16.96	8.27^{bc} ±0.10	145.43^{ab} ±7.79	76.17 ±2.94	2.44 ±0.20	101.57^{b} ±3.24
IV	117.92^{ab} ±4.59	7.63^{b} ±0.25	327.07 ±19.93	7.66^{c} ±0.12	117.35^{b} ±11.16	75.71 ±2.76	2.26 ±0.19	103.74^{b} ±2.80
V	105.92^{ab} ±8.86	7.72^{b} ±0.68	332.87 ±14.49	8.82^{ab} ±0.16	121.14^{b} ±0.93	84.03 ±2.81	2.65 ±0.19	104.14^{b} ±3.99
VI	140.37^{a} ±8.09	7.45^{b} ±0.25	335.38 ±29.06	9.41^{a} ±0.30	132.50^{ab} ±5.76	95.60 ±9.12	2.56 ±0.32	97.49^{b} ±1.94
SEM	5.03	0.21	7.17	0.15	3.89	3.74	0.10	1.76
P-value	0.001	0.013	0.891	0.001	0.001	0.602	0.343	0.003

4. Conclusion

Based on this study it was concluded that supplementation of nucleosides significantly improved body weight and blood biochemical parameters. Supplementation of nucleosides which can be converted to nucleotide resulted in increased digestion and absorption. Among the supplemented groups the group which was supplemented combined nucleosides had better performance than other groups.

5. References

1. Bartell SM, Batal AB. The effect of supplemental glutamine on growth performance, development of the gastrointestinal tract, and humoral immune response of broilers. Poultry science 2007;86(9):1940-7.
2. Buyse J, Janssens K, Van der Geyten S, Van As P, Decuypere E, Darras VM. Pre-and postprandial changes in plasma hormone and metabolite levels and hepatic deiodinase activities in meal-fed broiler chickens. British Journal of Nutrition 2002;88(6):641-53.
3. Carver JD, Walker WA. The role of nucleotides in human nutrition. The Journal of Nutritional Biochemistry 1995;6(2):58-72.
4. Esteve-Garcia E, Martinez-Puig D, Borda E, Chetrit C. Efficacy of a nucleotide preparation in broiler chickens. In Proceedings 16th European Symposium on Poultry Nutrition. Strasbourg, France 2007, 511-514
5. Garcia-Molina V, Aguilera JA, Gil A, Sanchez-Pozo A. Plasma lipoproteins in suckling rats: effect of dietary nucleotides. Journal of Clinical Gastroenterology 1991;6:184-90.
6. Grimble GK, Westwood OM. Nucleotides. In Nutrition and Immunology. Humana Press, Totowa, NJ 2000, 135-144.
7. ICAR. Nutrient Requirements of poultry. Indian Council of Agricultural Research, New Delhi, India 2013.
8. Izat AL, Thomas RA. Adams MH. Effects of dietary antibiotic treatment on yield of commercial broilers. Poultry Science 1989;68(5):651-5.
9. Jung B, Batal AB. Effect of dietary nucleotide supplementation on performance and development of the gastrointestinal tract of broilers. British poultry science. 2012;53(1):98-105.
10. Maribo H, Spring P. Yeast extract as a protein source for weaning piglets. Vitamine und Zusatzstoffe in der Ernährung von Mensch und Tier; Schubert R. Flachowsky G. Jahreis G. Bitsch R. Eds. 2003, 433-7.
11. Uauy R, Quan R, Gil A. Nucleotides in infant nutrition. In: Nutritional and Biological Significance of Dietary

Nucleotides and Nucleic Acids, ed. A Gil and R Uauy. Barcelona: Doyma. 1996, 169-180.
12. Uauy R, Stringel G, Thomas R, Quan R. Effect of dietary nucleosides on growth and maturation of the developing gut in the rat. Journal of pediatric gastroenterology and nutrition 1990;10(4):497-503.
13. Yamauchi K, Adjei AA, Ameho CK, Sato S, Okamoto K, Kakinohana S et al. Nucleoside-nucleotide mixture increases bone marrow cell number and small intestinal RNA content in protein deficient mice after an acute bacterial infection. Nutrition 1998;14:270.