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EFFICACY EVALUATION OF HERBAL ANTI- DIARRHEAL AND GUT FUNCTION MODULATOR IN AUGMENTING PERFORMANCE IN BROILER BIRDS

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ABSTRACT
A total of 120 day old commercial broiler chicks were divided into two different groups T0 and T1 having 60 birds each. Each treatment group had three replicates of 20 chicks each. Group T0 was kept as control and fed standard basal diet. Group T1 was supplemented with Salcochek pro (M/S Ayurvet Limited) at the rate of 500g/tonne of feed along with the basal diet. Parameters such as growth performance, nutrient utilization, carcass study, Intestinal micrometry, incidence of diseases and mortality were evaluated. Results revealed that there was significant increase in the body weight in the Salcochek pro treated group T1 when compared to control group T0. The total FCR was significantly improved in group T1 as compared to group T0. Mean digestibility coefficient of dry matter and crude protein were significantly higher in the group T1 as compared to group T0. The nitrogen % retention was significantly higher in group T1 in comparison to group T0. Live weight (Kg) and Carcass weight (Kg) were significantly higher in group T1 as compared to group T0. It can be inferred that Salcochek pro is quite efficient in enhancing the performance and productivity of broilers.

KEYWORDS: Broilers, carcass weight, growth performance, nutrient utilization.

INTRODUCTION
The gut is a pivotal organ system which mediates nutrient uptake and use by the animals. The gut is also a major site of potential exposure to environmental pathogens.[1] When gut health is compromised, digestion and nutrient absorption are affected which, in turn, can have a detrimental effect on feed conversion leading to economic loss and a greater susceptibility to disease.[2] Because different bacterial species have different substrate preferences and growth requirements, the chemical composition of the digesta, to a large extent, determines the compositions of the microbial community in the GI tract[3] Performance and profitability of poultry operation depends not only on the quality of feed offered but also the gut health of the birds. A subtherapeutic use of antibiotics has been widely practiced in poultry industry for decades to maintain the balance of ecosystem in the gut as well as to improve the growth performance of chicken.[4] During antibiotic therapy, many antibiotics produce profound changes in the microflora[5][6][7] leading to the development of antibiotic resistance. An acute demand for herbal remedy has been largely driven by the need to do away with the deleterious effects that accompany the use of antibiotics. The benefits of herbal extracts in improving growth performance and nutrient digestibility, and reducing pathogens have been reported.[8] Further studies in this direction are required to realize the potential of various herbs in improving gut function and thereby help provide an alternative to antibiotic therapy. The present study is designed to evaluate the effect of herbal gut function modulator in accelerating various performance parameters and increasing productivity.

MATERIALS AND METHODS
Experimental design
A total of 120 day old commercial broiler chicks were procured from college of Veterinary Science, Khanapara, Guwahati, Assam. They were wing banded and segregated into two groups T0 and T1 with 60 birds in each group. Each treatment group had three replicates of 20 chicks each. Group T0 was kept as control and was fed standard basal diet without any treatment. Group T1 was supplemented with Salcochek pro (M/S Ayurvet Limited) at the rate of 500 g/tonne of feed for a period of 42 days along with standard basal diet. Parameters such as growth performance, nutrient utilization, carcass study, intestinal micrometry, incidence of diseases and mortality were recorded. All the data obtained were analyzed as per the standard statistical procedure.[9]

RESULTS AND DISCUSSION

Mean initial, weekly and final body weight

There was a significant increase in body weight (g) in the Salcochek pro treated group T1 (2445.37g) as compared to the control group T0 (2340.72 g) at the end of 6th week (table 1).Studies have shown that *Aegle maemelos*, which is a constituent ingredient of Salcochek, helps to improve gut function[10] and decrease intestinal propulsion[11] and increase carbohydrade absorption[12], the confluence of which may lead to increased body weight following the supplementation of Salcochek pro.

Table 1. Mean initial, weekly and final body weights of experimental broilers (gm)

	Week 0	Week 1	week 2	week 3	week 4	week 5	week 6
To	42.25± 0.29^{a}	165.24± 1.13^{b}	390.00±2.74^{a}	776.53±2.72^{a}	1244.60±3.67^{a}	1780.44±11.92^{a}	2340.72±3.41^{a}
T1	42.00±0.14^{a}	168.75±0.76^{a}	389.90±5.64^{a}	779.71±12.89^{a}	1280.23±6.37^{b}	1845.50±32.61^{bc}	2445.37±28.55^{b}

Means with different superscripts differ significantly (P≤0.05).

Mean weekly and total gain in body weight

The total gain in body weight was significantly higher in Salcochek pro treated group T1 (2403.33 g) as compared to control group T0 (2298.38 g) (table 2). The increase in body weight gain may be attributed to the hepatoprotective effect[13] conferred by *Aegle marmelos*. *Aegle marmelos* is also known to aid in digestion which may be one of the reasons for increased weight gain.

Table 2 Mean weekly and total gain in body weights of experimental broilers (gm)

Tr.	Week1	Week 2	Week 3	Week 4	Week 5	Week 6	Total
T_0	122.99±1.18^{a}	224.76±3.79^{a}	386.53±5.07^{a}	468.07±5.87^{a}	535.83±8.46^{a}	560.29±14.36^{a}	2298.38±7.94^{a}
T_1	126.75±0.63^{ab}	221.15±5.27^{a}	389.81±9.14^{a}	500.52±6.77^{b}	565.27±26.24^{ab}	599.87±6.24^{a}	2403.33±3.22^{b}

Means with different superscripts differ significantly (P≤0.05).

Feed conversion ratio

The FCR was significantly better in the Salcochek pro treated group T1 (1.81) in comparison to the control group T0 (1.84) (table 3). The improved FCR may be ascribed to the presence of xylose[14] and galacturic acid[15], two phytoactive constituents of *Plantago ovata*, known to improve FCR.

Table 3 Mean weekly and total feed conversion ratio of experimental Broilers

Tr.	1st week	2nd week	3rd week	4th week	5th week	6th week	Total
T_0	1.19± 0.02^{a}	1.36±0.03^{a}	1.59±0.03^{a}	1.80±0.02^{a}	1.95±0.02^{a}	2.26±0.06^{a}	1.84±0.00^{a}
T_1	1.19±0.01^{a}	1.36±0.03^{a}	1.56±0.03^{a}	1.74±0.04^{a}	1.90±0.08^{a}	2.25±0.03^{a}	1.81±0.01^{b}

Means with different superscripts differ significantly (P≤0.05).

Mean digestibility coefficient of organic nutrient

There was significant increase in the mean digestibility co- efficient of dry matter in the Salcochek pro treated group T1 (68.78) as compared to the control group T0 (65.52). There was also significant increase in the mean digestibility co- efficient of crude protein in the Salcochek pro treated group T1 (69.81) as compared to control group T0 (67.51). There was no significant difference in the digestibility coefficient of ether extract and crude fibre between group T1 and group T0 (table 4). The increase in mean digestibility coefficient of DM and CP may be due to the presence of *Punica granatum*, a constuent ingredient of Salcochek pro.[16]

Table 4 Mean digestibility coefficient of organic nutrient

Tr.	Dry matter	Crude protein	Ether extract	Crude fibre
T_0	65.52±0.37^{a}	67.51±0.28^{a}	81.00±0.51^{a}	24.26±0.26^{a}
T_1	68.78±0.17^{b}	69.81±0.35^{bc}	81.34±0.25^{a}	24.27±0.21^{a}

Means with different superscripts differ significantly (P≤0.05).

Percentage of retention of nitrogen, calcium and phosphorus of broilers

Results revealed that there was a significant increase in the nitrogen retention % of the experimental broilers in the Salcochek pro treated group T1 when compared to control group T0. The percentage of retention of calcium and phosphorus was non- significantly variable between group T1 and group T0 (table 5). The increase in nitrogen retention % may be due to the presence of *Aegle marmelos*, a constituent ingredient of Salcochek pro which has been reported to increase nutrient retention percentage.[17] The increase in nutrient retention may be due to up-regulation the skeletal muscle metabolic regulators (GLUT-4 and AMPK1-α) brought about by *Aegle marmelos*.[18]

Table 5 Percentage of retention of nitrogen, calcium and phosphorus of experimental broilers.

Tr.	Nitrogen	Calcium	Phosphorus
T_0	59.25±0.76[a]	51.76±0.50[a]	50.80±0.30[a]
T_1	61.02±0.72[ab]	52.25±0.35[a]	51.29±0.23[a]

Means with different superscripts differ significantly (P≤0.05).

Carcass characteristics

Results indicated a significant increase in the live weight (Kg) in the Salcochek pro treated group T1 as compared to control group T0. Similarly, an increase in the carcass weight (Kg) in group T1 was also recorded which was significantly higher than group T0. There was no significant difference in the dressing %, abdominal fat %, intestinal pH and colour of meat between group T1 and T0 (table 6).

Table 6 Carcass characteristics

Tr.	Live weight (Kg)	Carcass weight (Kg)	Dressing percentage	Abdominal fat (% of carcass weight)	Intestinal pH	Colour of meat
T_0	2.350±0.03[a]	1.680±0.02[a]	71.49±0.01[a]	2.11±0.01[a]	6.3±0.12[a]	Light pink
T_1	2.450±0.01[b]	1.790±0.02[bc]	73.06±0.33[a]	2.26±0.01[a]	6.7±0.12[a]	Light pink

Means with different superscripts differ significantly (P≤0.05).

Intestinal Micrometry

Intestinal micrometry revealed an increase in the villus height, villus width, crypth depth of the duodenum in the group T1 as compared to group T0. Similar pattern of increase in the intestinal micrometry of ileum was observed in Salcochek treated group T1 which was recorded to be higher than the control group T0. The mortality % was also less in the Salcochek pro treated group T1 when compared to control group T0 (table 7).

Table 7 Intestinal micrometry

Parameters	Dietary Treatments	
	T0	T1
Deodenum		
Villus height (µm)	753.50	766.58
Villus width (µm)	111.87	158.93
Crypt depth (µm)	94.60	94.53
Villus height : Crypt depth	7.97	8.11
Ileum		
Villus height (µm)	353.50	366.58
Villus width (µm)	108.89	112.54
Crypt depth (µm)	76.60	82.32
Villus height : Crypt depth	4.61	4.45
GALT	1-2	1-2
No. of mortalities	4	3
Mortality rate (%)	6.67	5.00

Economics of the product supplementation

It was observed that maximum profit obtained per bird was higher in the Salcochek pro treated group T1 at Rs. 52.67 as compared to control group T0 at Rs. 46.62 (table 8).

Table 8 Economics of product supplementation

Parameters	Dietary treatment	
	T0	T1
Cost per day old chick (Rs.)	24	24
Av. Total Feed consumed (Kg)	4.220	4.348
Av. Cost of per Kg feed (Rs.)	34	34
Cost of total feed consumed (Rs.)	143.48	147.83
Miscellaneous cost per bird (Rs.)	20	20
Av. total cost per bird (Rs.)	187.48	191.83
Av. Live weight per bird (Kg)	2.341	2.445
Market price per Kg live weight (Rs.)	100	100
Av. Total price earning per bird (Rs.)	234.10	244.50

Av. Profit per bird (Rs.)	**46.62**	**52.67**
Av. Profit per Kg live weight (Rs.)	19.91	21.54

CONCLUSION

Herbal gut function modulator can significantly improve gut health in poultry and augment the performance of birds in terms of body weight gain, FCR, improved carcass characteristics etc. as a sequel to healthy gut function while doing away with the deleterious side effects that accompany the use of antibiotics.

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