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Study The Effect Of Natural Lysine Supplementation In Comparison To Synthetic Lysine On Broiler Performance

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ABSTRACT
A 42-day farm experiment was conducted to assess the comparative efficacy of herbal and synthetic lysine in enhancing broiler performance. Two hundred Cobb 500 broiler chicks, one day old, were allocated into five groups, each with four replicates of ten birds. Group T1 received a standard ration without herbal sources (Control), T2 featured a blend of 25% herbal lysine and 75% synthetic lysine, T3 consisted of a 50:50 blend, T4 had 75% herbal lysine and 25% synthetic lysine, and T5 received 100% herbal lysine. Among the groups, T3 exhibited the highest weight gain and superior feed efficiency compared to the control and other groups. Parameters such as dressing percentage, heart, liver, kidney, gizzard weight, abdominal fat, and intestinal length displayed no significant differences among the groups. Liver and breast muscle lipid content were lower in T2 compared to the control (T1), while in the thigh, it was higher. The supplementation of herbal and synthetic lysine at a 50:50 ratio resulted in superior returns compared to the control. In conclusion, a 50:50 supplementation of herbal and synthetic lysine in the broiler diet improved bird performance and concurrently reduced the feed cost per unit weight gain.

Key Words: *Natu Lysine, Natural Lysine, Broiler Chicken, synthetic lysine, Rivansh Animal Nutrition*

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I. INTRODUCTION

Efficient feed utilization, rapid weight gain, disease prevention, and low mortality rates are crucial factors contributing to the success of poultry production. Despite significant advancements in poultry nutrition over the past few decades, persistent nutritional challenges remain, posing ongoing hurdles for researchers. The continuous enhancement of the genetic potential of broiler chickens necessitates a revaluation of nutrient requirements to align with evolving genetic improvements.

Amino acids, as fundamental building blocks of proteins, play a vital role in maintaining protein quality, growth rate, and carcass composition. Consequently, they have gained substantial attention in the feed industry. The widespread practice of supplementing broiler feeds with amino acids, particularly lysine, proves to be more economical than increasing the proportion of soybean meal or other natural protein sources to meet dietary requirements. Lysine, an essential amino acid, must be included in the chicken diet as poultry birds cannot synthesize it in sufficient quantities for their life and growth. Lysine facilitates calcium absorption, antibody production, and the activity of hormones and enzymes. Furthermore, in conjunction with vitamin C, lysine forms carnitine, enhancing the efficiency of muscle tissue in utilizing oxygen. Lysine deficiency can lead to depigmentation in birds and reduced haemoglobin and hematocrit levels in chickens.

Natu Lysine from Rivansh Animal Nutrition Pvt Ltd is a natural form of lysine containing herbal ingredients extracted from Asparagus officinalis, Emblica officinalis, Tinospora cordifolia, Ocimum sanctum, Withania somnifera, Mangifera indica, and Piper nigrum that mimic the activity of lysine.

The increasing demand for affordable meat has prompted the use of synthetic compounds in animal feeds. This study aimed to evaluate the effectiveness of herbal and synthetic lysine supplementation on broiler performance.

II. MATERIAL & METHOD

In this trial, 200 Cobb 500 broiler male chicks aged one day were obtained from a hatchery for experimentation at Govindnand Sagar Herbal Farm in Village Jarora, Teh Ghumarwin, Distt. Bilaspur, Himachal Pradesh. The chicks were distributed into five treatment groups (T1 to T5), each consisting of four replicates with ten birds in each replicate. The treatment groups included T1 (standard ration), T2 (25% herbal

lysine + 75% synthetic lysine), T3 (50% herbal lysine + 50% synthetic lysine), T4 (75% herbal lysine + 25% synthetic lysine), and T5 (100% herbal lysine).

All diets were formulated to be isocaloric and isonitrogenous, with proximate principles analyzed according to AOAC (1995) standards. The birds received pre-starter, starter, and finisher diets from 1 to 14, 15 to 28, and 29 to 42 days of age, respectively. Housed in deep litter pens with coconut coir pith as litter material, the birds were raised following standard management practices. Feed and water were provided ad-libitum, and all birds were vaccinated against Ranikhet disease on the 7th day and infectious bursal disease (IBD) on the 14th day. Daily records were maintained for feed offered and mortality.

Biweekly measurements were recorded for feed intakes, body weight gain, and feed conversion efficiency. At the end of the 42-day experimental period, six birds from each treatment were slaughtered to measure carcass, liver, heart, kidney, gizzard weight, and intestinal length. The lipid content of the liver, thigh, and breast muscles was estimated using the Folch et al. (1957) method.

The cost of various experimental rations was calculated based on the actual cost of feed ingredients, supplements, and additives. Additionally, the cost of feed per unit gain in weight for each group was determined. Statistical analysis of the data followed the methods outlined by Snedecor and Cochran (1989), with means of different experimental groups tested for statistical significance.

III. RESULT AND DISCUSSION

Tables 1 to 3 provide the chemical composition of diets, while Tables 4 to 6 present data on weight gain (g), feed intake (g) & feed efficiency, liveability for broilers subjected to varying levels of herbal and synthetic lysine. During the pre-starter and starter periods, weight gain did not exhibit significant differences among groups receiving different levels of herbal and synthetic lysine. However, in the finisher phase, all lysine-supplemented groups showed higher weight gain than the control. In the overall phase, the group supplemented with 50% herbal and 50% synthetic lysine demonstrated numerically higher body weight compared to both the respective treatment groups and the control. Consistent with earlier findings, the present study observed alignment in feed intake, weight gain, and feed efficiency. This alignment may be attributed to the impact of balanced amino acids in the treatment groups, promoting protein synthesis and subsequently enhancing weight gain. Pre-starter and finisher phase feed intake closely matched that of the control, while in the finisher and overall phases, treatment groups T2 and T5 exhibited lower feed intake compared to the control, a trend also observed in earlier studies.

During the pre-starter phase, the control group exhibited better feed conversion efficiency than the treatment groups. However, in the starter phase, the 25:75 lysine supplemented groups demonstrated improved feed efficiency. In the finisher and overall phases, feed efficiency was superior in the 25%, 50%, and 100% herbal lysine groups compared to the control. These results align with the findings of other researcher and suggest that the efficiency of feed utilization for monogastric animals is influenced by lysine and methionine levels in the diet, as indicated by the NRC (1994).

Carcass traits, including dressing percentage, heart weight, liver weight, kidney weight, gizzard weight, and intestinal length, were comparable and unaffected by the inclusion of herbal and synthetic lysine. In all treatment groups, breast lipid content was lower compared to the control (T1), while higher lipid content was recorded in the thigh. The supplementation of lysine in broiler rations is known to elevate protein concentration in the liver, thereby reducing liver lipid content, which has beneficial effects on the birds.

This finding suggests that the supplementation of herbal lysine may facilitate efficient lipid metabolism in the liver, aiding in the transportation of lipids to body tissues and potentially reducing the incidence of fatty liver in birds.

IV. CONCLUSION

In conclusion, the study indicates that the supplementation of lysine, specifically at an inclusion level of 50% herbal and 50% synthetic combination, led to improved bird performance and a reduction in feed cost per unit weight gain. This finding underscores the potential benefits of such lysine supplementation in optimizing the efficiency of poultry production.

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Table 1.
Ingredient composition of broiler starter (0-14 d) diet (on % DM basis)

Feed Ingredient	Treatments				
	T_1	T_2	T_3	T_4	T_5
Yellow maize	53	53	53	53	53
Deoiled soybean meal	36.3	36.3	36.3	36.3	36.3
Deoiled rice bran	2.4	2.4	2.4	2.4	2.4
Fish meal	2	2	2	2	2
Soybean oil	2.5	1.6	0.8	2.5	1.6
Di calcium phosphate	1.7	1.7	1.7	1.7	1.7
Limestone powder	0.7	0.7	0.7	0.7	0.7
DL-methionine	0.2	0.2	0.28	0.28	0.28
Lysine Hcl	0.2	0.15	0.1	0.05	0
Natu Lysine	0	0.05	0.1	0.15	0.2
Sodium bicarbonate	0.17	0.17	0.17	0.17	0.17
Common salt	0.28	0.28	0.28	0.28	0.28
Premix*	0.56	0.56	0.56	0.56	0.56

Premix: trace mineral premix (mg/kg diet); Mn 25; Fe 30; Zn 27.5; Cu 5.62; Se 0.08; Co 0.07; I 0.62; vitamin premix (per kg diet): vit. A 3900 IU; vit. K 1mg; vit. E 30 mg; vit. D_3 1312.5 IU; vit. B_1 0.9 mg; vit. B_2 3mg; vit. B_{12} 0.005mg; niacin 14.3 mg; pantothanic acid 2 mg; folic acid 1.25 mg; biotin 0.04 mg; Ca pentothenate 3.75 mg; salinomycin (Coxistac 12%) 30 ppm;.

Table 2. Ingredient composition of broiler grower (14-28 d) diet (on % DM basis)

Feed Ingredient	Treatments				
	T_1	T_2	T_3	T_4	T_5
Yellow maize	56.4	56.4	56.4	56.4	56.4
Deoiled soybean meal	33.3	33.3	33.3	33.3	33.3
Fish meal	2	2	2	2	2
Soyabean oil	4.6	3.81	3.02	4.6	3.81
Di calcium phosphate	1.6	1.6	1.6	1.6	1.6
Limestone powder	0.7	0.7	0.7	0.7	0.7
DL-methionine	0.2	0.2	0.2	0.2	0.2
Lysine	0.16	0.12	0.08	0.04	0
Natu Lysine	0	0.04	0.08	0.12	0.16
Sodium bicarbonate	0.16	0.16	0.16	0.16	0.16
Common salt	0.33	0.33	0.33	0.33	0.33
Premix*	0.58	0.58	0.58	0.58	0.58

*Premix: trace mineral premix (mg/kg diet); Mn 25; Fe 30; Zn 27.5; Cu 5.62; Se 0.08; Co 0.07; I 0.62; vitamin premix (per kg diet): vit. A 3900 IU; vit. K 1mg; vit. E 30 mg; vit. D_3 1312.5 IU; vit. B_1 0.9 mg; vit. B_2 3mg; vit. B_{12} 0.005mg; niacin 14.3 mg; pantothanic acid 2 mg; folic acid 1.25 mg; biotin 0.04 mg; Ca pentothenate 3.75 mg; salinomycin (Coxistac 12%) 30 ppm;

Table 3.
Ingredient composition of broiler finisher (28-42 d) diet (on % DM basis)

Feed Ingredient	Treatments				
	T_1	T_2	T_3	T_4	T_5
Yellow maize	59.7	59.7	59.7	59.7	59.7
Deoiled soybean meal	26.3	26.3	26.3	26.3	26.3
Fish meal	5	5	5	5	5
Soybean oil	5.5	4.71	3.91	5.5	4.71
Di calcium phosphate	1.31	1.31	1.31	1.31	1.31
Limestone powder	0.7	0.7	0.7	0.7	0.7
DL-methionine	0.22	0.22	0.22	0.22	0.22
Lysine Hcl	0.16	0.12	0.08	0.04	0
Natu Lysine	0	0.04	0.08	0.12	0.16

Sodium bicarbonate	0.23	0.23	0.23	0.23	0.23
Common salt	0.26	0.26	0.26	0.26	0.26
Premix*	0.62	0.62	0.62	0.62	0.62

*Premix: trace mineral premix (mg/kg diet); Mn 25; Fe 30; Zn 27.5; Cu 5.62; Se 0.08; Co 0.07; I 0.62; vitamin premix (per kg diet): vit. A 3900 IU; vit. K 1mg; vit. E 30 mg; vit. D_3 1312.5 IU; vit. B_1 0.9 mg; vit. B_2 3mg; vit. B_{12} 0.005mg; niacin 14.3 mg; pantothanic acid 2 mg; folic acid 1.25 mg; biotin 0.04 mg; Ca pentothenate 3.75 mg; salinomycin (Coxistac 12%) 30 ppm; bacitracin methylene di salicyclate (BMD110) 55ppm.

Table 4. The effect of supplementation of Natu Lysine individually or in combination with lysine hcl on weekly feed intake in broiler chicken (0-42 days)

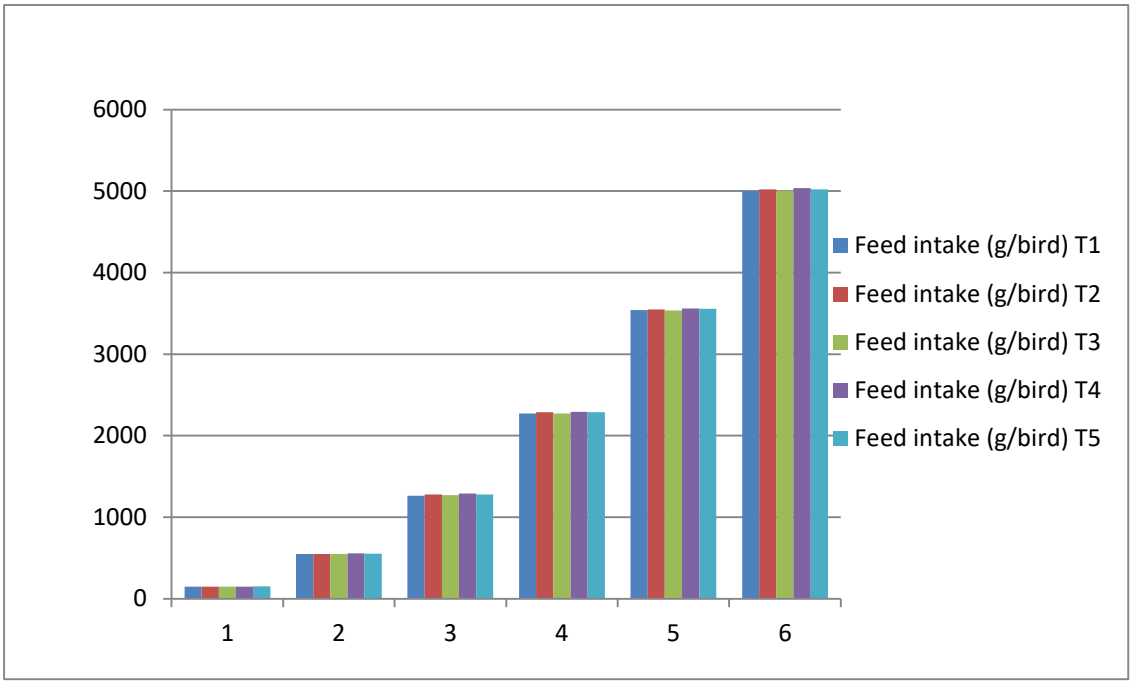
	Feed intake (g/bird)				
Period (day)	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**
7	146	148	147	148	150
14	547	550	548	555	554
21	1263	1278	1269	1289	1280
28	2273	2287	2270	2290	2287
35	3540	3550	3537	3560	3554
42	4999	5020	5003	5035	5022

Table . 5 The effect of supplementation of Natu Lysine individually or in combination with lysine Hcl on average on average body weight of broiler chicken (0-42d)

Period (day)	**Weight gain (g/week)**				
	T_1	**T_2**	**T_3**	**T_4**	**T_5**
0	46.5	47.7	47.7	48	47.5
7	194	195	195	190	192
14	534	535	540	525	530
21	1042	1040	1050	1030	1035
28	1675	1672	1680	1650	1660
35	2392	2381	2398	2378	2380
42	3147	3132	3155	3118	3130

Table 6.
The effect of supplementation of vitamins and minerals individually or in combination on weekly feed conversion ratio (FCR) in broiler chicken (0-42d)

Period (day)	**FCR (per week)**				
	T_1	**T_2**	**T_3**	**T_4**	**T_5**
7	0.75	0.76	0.75	0.94	0.92
14	1.02	1.03	1.01	1.06	1.05
21	1.21	1.23	1.21	1.25	1.24
28	1.36	1.37	1.35	1.39	1.38
35	1.48	1.49	1.47	1.50	1.49
42	1.59	1.60	1.59	1.61	1.60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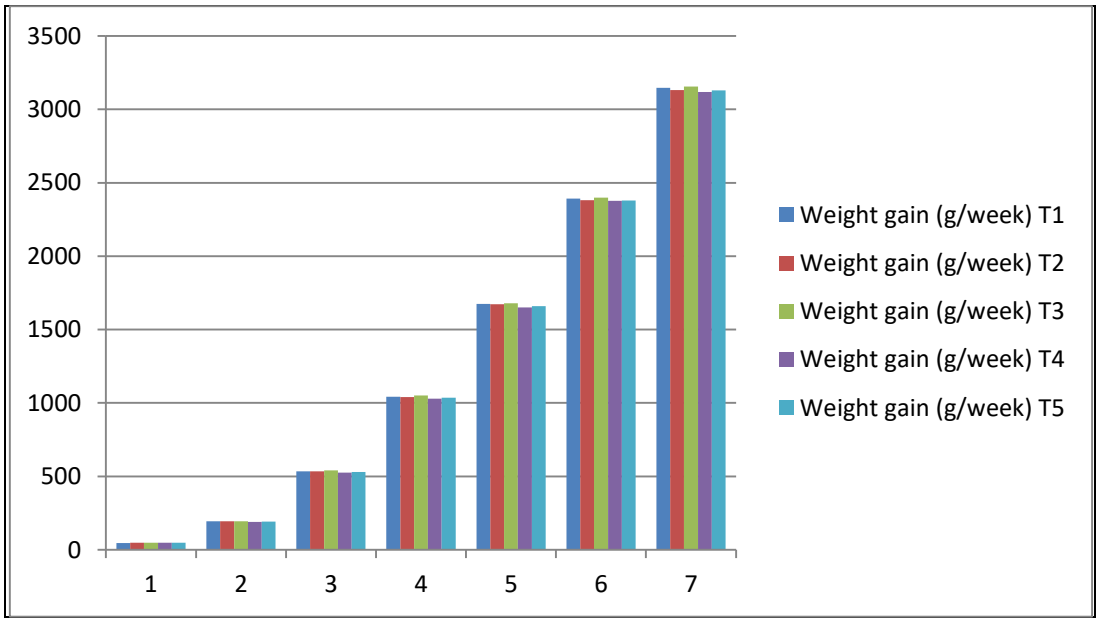
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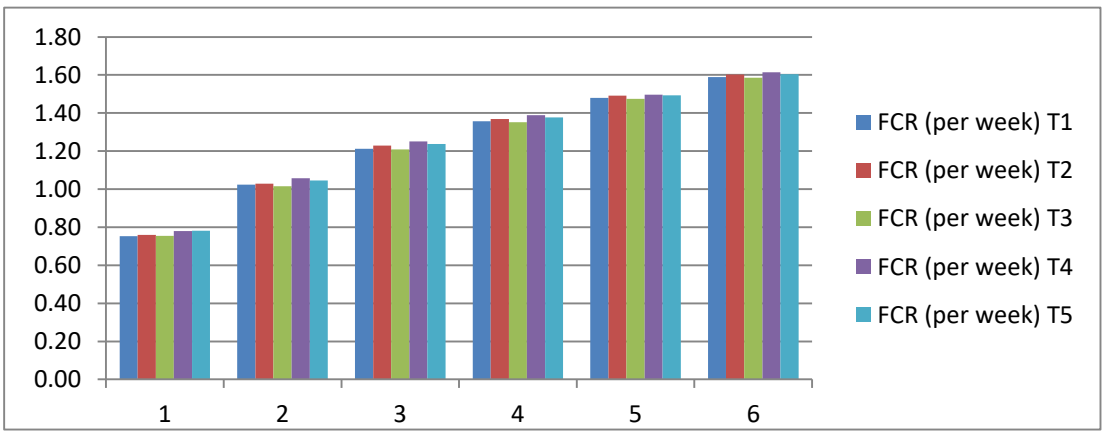
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