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Effect of protein, energy and probiotics on juvenile growth and economy of dual colour chicks

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Abstract
Effect of protein, energy and probiotics on juvenile growth traits and economic of colour dual chicks was evaluated by feeding diet having 3 protein levels i.e. P_1 (17% cp), P_2 (19% cp), P_3 (21% cp), 2 energy levels i.e. E_1 (2700 Kcal ME/kg), E_2 (2900 Kcal ME/kg) and 3 probiotic levels i.e. B_0 (0%), B_1 (0.025%, B_2 (0.05%) in a factorial designed experiment, conducted during summer period. Body weight (BWt), Feed intake (FI), Feed efficiency (FE) and Shank length (SL), were similar in P_2 and P_3 protein and found significantly higher than P_1 lower protein diet. Breast angle (B A), and carcass yield were significantly higher in P_2 than P_1 and P_3 protein diets. Significantly better FE, BA and carcass yield were recorded in E_2 energy diet. Body wt, FI and SL were non significantly different in E_1 and E_2 diet. Probiotic levels B_1 and B_2 did not differ significantly for BWt, FE, BA, SL and carcass yield and found significantly better than B_0 diet for all these traits. FI was significantly higher with increased level of probiotics. Cost benefit analysis showed that P_2 protein, E_2 energy and B_2 probiotic levels in diet fetched higher net return at 10^{th} week of age during summer.

Keywords: Colour dual chicks, protein, energy, probiotics, growth traits, economics

1. Introduction
Rural poultry has enormous growth potential but the major constraints lies with availability of suitable germplasm. Aiming this objective, a colour dual flock containing 75% Jabalpur colour and 25% kadaknath inheritence has been developed at Jabalpur centre under All India Co-ordinated Research Project. To assess growth performance of any flock, protein and energy are two first consider nutrients. Genetic and environmental influence on requirement of these nutrients has been reported in literature Sorenson, (1996) [17] Probiotic in poultry as an alternate of antibiotic as well as performance enhancer has been widely accepted in poultry production. In the above context the present study was therefore conducted to evaluate the affect of protein, energy and probiotic supplementation on juvenile growth traits and economy of rearing colour dual chicks.

2. Materials and Methods
Dual type coloured chicks (75% Jabalpur colour, 25% kadaknath) were generated by crossing synthetic Jabalpur colour line females with crossbred kadaknath males (50% JBC : 50% Kd). 180 day old healthy chicks were randomly distributed in nine dietary treatment groups. Each treatment group having two replicates of 10 chicks in each. Six diets were prepared with protein levels P_1 (17% cp), P_2 (19% cp), P_3 (21% cp) and energy levels E_1 (2700 Kcal ME/kg), E_2 (2900 Kcal ME/kg). Each of these six diets were supplemented with probiotics at levels of B_0 (Without probiotic), B_1 (0.025%), B_2 (0.05%). Body weight and feed efficiency were measured biweekly. Conformation traits and carcass yield were measured at 10^{th} week of age. Birds were slaughtered using appropriate method. Ingredients involved in diet preparation were maize, rice polish, deoiled rice polish, soyabean meal, mineral mixture, vitamin mixture, salt and coccidiostate. Probiotic used was manufactured by Tetragon chemie pvt. Ltd. Bangalore. Each kg of provilacc containing sacchromycess creviscae (5855 billion cfu), lactobacillus sporogens (14040 million cfu), lactobacillus acidophilus (14040 milion cfu) and Bacillus subtillis (15000 million cfu). Factorial design was used to conduct experiment and analysis of data as per snedecor and Cocharan (1989) [16].

3. Results and Discussion
Tenth week body weight was non significant between P_2 and P_3 protein and these were

significantly higher than P_1 lower protein diet. Janoria (2010) [4] reported higher 12th week body weight of colour dual chicks fed 22-18% cp. diet. Moderate protein requirement of dual type vanraja chicks was reported by Rao *et al.* (2005) [10]. The present finding was in agreement to these authors. Chicks in E_2 dietary energy gained higher body weight than E_1 with non significant difference between them. B_0 probiotic chicks had significantly lower body weight than B_1 and B_2 which were non significantly different. Consistent finding for effect of probiotics on body weight was reported by Sabiha *et al.* (2005) [12], Singh *et al.* (2009) [15] and Nikpiram *et al.* (2013) [7]. Feed intake was significantly higher and feed efficiency was significantly better with P_2 and P_3 protein than P_1 lower protein diet. P_2 and P_3 protein were non significantly different for FI and FE. These results supported finding of Rajpura *et al.* (2010) [9] and Giri *et al.* (2011) [2]. Increasing dietary energy from E_1 to E_2 level has result in decreased FI and improved FE of birds, although significant difference was observed for FE. The results collaborated with the finding of Rajini *et al.* (1998) [8] and Rajpura *et al.* (2010) [9]. Significantly higher FI in probiotic supplemented diet was in accordance with the results of Hoshmani *et al.* (2006) [3], Toghyani and Tabeidiant (2011) [19] whereas, significantly better feed efficiency with probiotic substantiated finding of Hoshamani *et al.* (2006) [3] and Singh *et al.* (2009) [15]. In synergism with body weight breast angle and Shank length were recorded significantly higher in P_2 and P_3 protein than P_1 lower protein diet. Mahadik (1994) [5] and Cahaner *et al.* (1995) [1] reported significantly better conformations in high protein diet. Giri *et al.* (2011) [2] observed similar finding in colour broilers. The present result was in agreement to these authors. Significantly higher BA was recorded in E_2 than E_1 lower energy diet whereas SL was unaffected by dietary energy. Supplementation of probiotic significantly improved BA and SL over B_0 diet. B_1 and B_2 were non significantly different for these traits. Carcass yield in P_2 and P_3 were similar and significantly better than P_1 lower protein diet. Consistent finding for protein effect was reported by Saki *et al.* (2007) [13] and Janoria *et al.* (2010) [4]. In contrary Mandal *et al.* (2010) did not observed effect of protein on carcass yields of colour broilers. Dietary energy E_2 has significantly higher carcass yield than E_1 lower energy diet. Significantly increased carcass yield was observed with probiotic supplementation whereas two levels of probiotic did not revealed significant difference. Similar to the present finding, Shabani *et al.* (2012) [14] reported significant effect of probiotic on meat yield of broilers. Contrarily non significant effect of probiotics on carcass yield was reported by Mehr *et al.* (2007) [6].

Cost benefits analysis presented in table 2. Feeding cost of coloured dual birds reared upto 10th week was similar in P_2 and P_3 protein and recorded significantly higher than P_1 lower protein diet. Dietary energy E_1 and E_2 revealed non significant difference in cost of feeding. This was due to lower feed intake with E_2 high energy diet. Supplementation of probiotic has increased feeding cost due to increased feed intake. Other expenditures (Chicks, litter, medicines and light cost), as common value was added to feedings cost of each treatment to estimate total expenditure.

Birds were sold @ Rs. 105/kg body weight. At 10th week of age, net return / bird in P_2 (Rs. 10.53) and P_3 (Rs. 10.56) were almost similar and significantly higher than P_1 (Rs. 8.40) lower protein diet. E_2 energy diet has significantly higher net return / bird (Rs. 10.15) than E_1 (Rs. 8.22) lower energy diet. Effect of dietary energy on cost - benefit ratio has been reported by Roy *et al.* [10]. The respective net return in B_0, B_1 and B_2 protiotic levels were Rs. 8.49, Rs. 11.40, Rs. 12.95 per bird, shown significant difference. The increased net return with probiotic supplementation was in agreement with result of Swain *et al.* [18] and Mehr *et al.* [6]. The result shown higher net return at 10th week from coloured dual chicks with P_2 protein, E_2 energy and B_2 probiotic level in diet.

Table 1: Effect of treatments on performance of colour dual chicks at 10th week age during summer

Treatment	Body wt. (g)	Feed intake (g)	Feed efficiency	Breast angle (0)	Shank length (cm)	Carcass yield (%)
P_1	1064.2^b	2915^a	2.74^b	58.19^b	7.61^b	67.74^a
P_2	1120.7^a	3010^b	2.68^a	60.09^a	7.93^a	68.48^b
P_3	1125.0^a	2990^b	2.65^a	59.17^b	7.84^a	68.78^b
E_1	1095.0	3015	2.75^b	58.81^b	7.78	68.13^b
E_2	1110.5	2990	2.69^a	59.49^a	7.80	68.51^a
B_0	1075.0^b	2940^a	2.73^b	57.58^b	7.61^b	68.08^b
B_1	1125.0^a	3020^b	2.68^a	60.452^a	7.90^a	68.47^a
B_2	1160.0^a	3130^c	2.69^a	60.43^a	7.88^a	68.35^a

Means in a column for a trait with uncommon superscripts differ significantly ($p<0.01$).

Table 2: Effect of treatments on economic of rearing colour dual chicks upto 10th week of age during summer

Treatment	Cost per kg feed (Rs.)	Feeding cost up to 10th week (Rs.)	Other expenditure (Chicks, litter, light, medicines) (Rs.)	Total expenditure (Rs.)	Income on sale of birds @Rs. 105/kg	Net return (Rs.)
P_1	23.44	68.32^b	35	103.32^b	111.72^b	8.40^b
P_2	23.97	72.14^a	35	107.14^a	117.67^a	10.53^a
P_3	24.27	72.56^a	35	107.56^a	118.12^a	10.56^a
E_1	23.80	71.53^a	35	106.75^b	114.97^a	8.22^b
E_2	23.87	71.37^a	35	106.40^b	116.55^a	10.15^a
B_0	23.60	69.38^a	35	104.38^b	112.87^c	8.49^c
B_1	23.75	71.72^b	35	106.72^b	118.12^b	11.40^b
B_2	23.90	73.85^c	35	108.85^a	121.80^a	12.95^a

Means in a column for a trait with uncommon superscripts differ significantly ($p<0.01$).

4. Conclusion

Factorial experiment shown that P_2 Protein was found adequate in improving body weight, feed intake, feed efficiency and carcass yield. Energy (E_2) diet significantly better in feed efficiency, breast angle and carcass yield. Probiotic supplementation significantly improved all economic traits and P_2 Protein, E_2 Energy and B_2 probiotic level in diet.

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