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SEASONAL INFLUENCE ON THE DIETARY PROTEIN AND ENERGY REQUIREMENTS OF COMMERCIAL EGG TYPE STARTER CHICKS

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The importance of protein needs in relation to energy content of the ration has long been recognized (Hill and Danky, 1950). Reddy *et al.* (1977) suggested that a dietary protein level of 20% and an energy level of 2300 Kcal ME/kg. to be optimum and economical for starter chicks reared in cages. After studying the effect of housing system on protein and energy requirements of starter chicks, Anitha *et al.* (1991) reported that a dietary protein level of 20% with an energy level of 2300 Kcal/kg. diet appeared to be optimum during starter phase for commercial egg type pullets, irrespective of the type housing. Chicks require 22% protein having 2700 Kcal ME/kg. for optimum growth in summer (Cilly *et al.*; 1973). Since, the environmental temperature varies in different parts of the country, specific studies to suit the agro-climatic condition of a particular area is inevitable. Therefore, a study was conducted to assess the performance of commercial egg type starter chicks as influenced by varying levels of dietary protein and energy levels during winter season (November and December) in Kerala.

Materials and Methods

Five hundred and seventy six one-day old sexed female chicks of ILM 90 were procured, wing banded and weighed individually. They were grouped into 36 replicates having 16 chicks each. Four levels of dietary protein, viz., 14, 16, 18 and 20% CP and three levels of metabolisable energy, viz., 2300, 2500 and 2700 Kcal ME/kg. were employed in a factorial design. Thus, there were 12 treatments. Each treatment was replicated thrice. Allotment of chicks to different treatments and replicates were made at random. The birds were fed different experimental diets as outlined above. Composition of the experimental diet is presented in Table 1. The metabolisable energy values of the ingredients and rations were estimated using the prediction equation suggested by Carpenter and Clegg (1956). The available carbohydrate was estimated by the application of anthrone reagent (Clegg, 1956). The routine managemental practices were strictly adhered. Daily minimum and maximum temperature and relative humidity were recorded. Data pertaining to body weight, feed intake, feed conversion efficiency and mortality were recorded and subjected to statistical analysis (Snedecor and Cochran, 1967).

Results and Discussion

The climatic variables, namely, mean monthly temperature (minimum and maximum) and relative humidity and its ranges during the experimental period and the performance of chicks with respect to final body weight, feed intake, weight gain, feed conversion efficiency and cost of feeding during 0-8 weeks of age as influenced by varying levels of dietary protein and energy are presented in Tables 2 and 3.

When dietary protein in the diet was considered independently it was observed that at each incremental level of protein from 14 to 20% there was statistically significant betterment in 8th week body weight. The eighth week body weight of chicks fed with a ration containing 14% protein was 165.27g. as against 297.59g. among the chicks fed with 20% protein diets. The 8th

week body weight of chicks fed with protein levels of 16 and 18% were intermediary. The body weight gain data also behaved in the same fashion, the gain being significantly highest ($p < 0.01$) with 20% dietary protein than the other protein levels employed. Higher body weight and weight gain at higher dietary protein level was also reported by Reddy (1977) and Anitha *et al.* (1991). Even though there were numerical differences in feed consumption in chicks fed varying protein levels, the differences were not statistically significant. Reddy *et al.* (1989) and Anitha *et al.* (1991) also could not observe any significant difference in feed intake between different protein levels.

The feed conversion efficiency also showed similar trend as that of body weight and body weight gain. The efficiency was significantly poorest with 14% protein and significantly best with 20% dietary protein. Significantly superior body weight at higher protein levels with nonsignificant influence on cumulative feed intake for the various protein regimen groups has lead to this trend of feed conversion efficiency. The feeding cost was significantly highest ($P < 0.01$) with 20% dietary protein and was statistically comparable with 18% protein diet. It was significantly lower with each lower level of protein. Considering the protein level alone it appears that the dietary requirement of protein for the starter chicks is 20%.

When dietary energy level alone was considered it was observed that the body weight was significantly higher ($P<0.01$) with dietary energy level of 2300 Kcal ME/Kg in comparison with the other two levels, the difference between them being statistically similar. The body weight gain data also showed identical trend. This finding is in close agreement with Reddy *et al.* (1977). After conducting two trials with varying dietary protein and energy levels, they concluded that a dietary protein level of 20% and energy level of 2300 Kcal ME/kg to be optimum and economical for starter chicks. Cumulative feed consumption till 8th week of age was significantly highest with 2700 Kcal/ME followed by 2300 Kcal ME/kg. The lower feed intake was with diets containing 2500 Kcal ME/kg. This erratic trend in feed intake could be reviewed along with protein-energy interaction effect. Though there were numerical differences, that observed in respect of feed conversion efficiency among the three dietary energy levels were non-significant. The cost of feeding computed based on energy levels in the diet indicated that it was significantly highest with 2700 Kcal ME/kg when compared to the other lower levels; the difference between them being non-significant.

Statistical analysis of the data also revealed that interaction effect between energy and protein is statistically significant. It was observed that the 8th week body weight as well as body weight gain were significantly superior with dietary protein-energy combination of 18:2300 and 20:2300 than all other combinations. The cumulative feed consumption upto 8 weeks recorded for birds fed different combinations of dietary protein-energy were statistically similar. The feed efficiency was statistically superior with dietary protein-energy combinations of 18:2300 and 20:2300.

Summary

The protein and energy requirements of commercial egg type starter chicks during winter was investigated and found that the dietary allowances for protein and energy in chick starter during winter in Kerala is 18:2300.

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Table 1 Composition of experimental diets (%)

Ingredients (%)	Crude protein (%) ME (Kcal/kg)											
	14: 2300	14: 2500	14: 2700	16: 2300	16: 2500	16: 2700	18: 2300	18: 2500	18: 2700	20: 2300	20: 2500	20: 2700
Yellow maize	40.0	52.0	60.0	35.0	49.0	60.0	36.5	46.0	56.0	30.0	42.0	51.5
Rice polish	24.0	16.5	14.75	23.0	11.0	5.0	10.25	8.0	5.25	13.0	5.0	22.75
Wheat bran	13.5	8.0	-	12.0	9.0	3.0	17.0	8.25	-	13.5	8.75	-
Groundnut cake	2.5	3.5	8.0	8.0	9.0	12.0	11.5	16.0	14.0	15.0	15.0	16.5
Gingelly oil cake	5.0	5.0	2.0	7.0	7.0	5.0	10.0	10.0	10.0	14.0	15.0	15.0
Fish meal	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Saw dust	3.25	3.25	3.5	3.25	3.25	3.25	3.0	3.0	3.0	2.75	2.5	2.5
Mineral mixture	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Protein (%)	14.07	14.02	14.10	16.17	16.08	16.13	18.11	18.15	18.05	20.19	20.09	20.23
Energy (Kcal ME/kg)	2309	2518	2692	2315	2509	2711	2325	2516	2724	2329	2506	2727

Note: In addition, 25 g vitamin, 50 g coccidostat and 100 g Liv-52 are added to 100 kg of diet

Table 2 Meteorological data during the experimental period

Period	Temperature (°C)				Relative humidity (%)	
	Maximum	Range for maximum	Minimum	Range for minimum	Average	Range
November 1990	30.0	26-32	24.9	23-26	72	63-87
December 1990	30.4	29-32	24.9	24-26	63	55-75

Table 3 Influence of dietary protein and energy levels on the performance of starter chicks

Protein/Energy		8th week body weight (g)	Cumulative feed intake per bird (g)	Body weight gain (g)	Feed conversion efficiency	Cost of feeding (Rs.)
Protein	14	165.27^{a}	1212.46	127.22^{a}	9.74^{d}	4.84^{a}
	16	216.65^{b}	1232.79	179.50^{b}	6.90^{c}	5.05^{b}
	18	274.72^{c}	1284.22	236.77^{c}	5.58^{b}	5.38^{c}
	20	297.59^{d}	1274.34	259.67^{d}	5.02^{a}	5.51^{c}
Energy (Kcal ME/kg)	2300	262.38^{b}	1241.11^{b}	224.16^{b}	6.39	4.97^{a}
	2500	225.98^{a}	1195.39^{a}	188.19^{a}	6.84	4.99^{a}
	2700	228.06^{a}	1316.36^{c}	190.01^{a}	7.21	5.63^{b}
CD Protein	-	9.69**	-	9.68**	0.38**	0.19**
Energy	-	8.40**	38.59**	8.38**	-	0.16**
Protein x Energy	-	16.79**	-	16.76**	0.67*	-

Figures bearing same superscripts in a column within each character do not differ significantly.

* Significant at P<0.05 ** Significant at P<0.01

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