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Performance of Coloured Broilers with and without Enzymes Supplementation Fed SFC Included Varying Crude Fibre Diets

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A B S T R A C T

Diet containing 5% crude fibre (CF) was incorporated with 20 % and 40 % Sun flower meal (SFC) by replacing Soybean meal (SBM) to prepare 7 and 9 % CF diet and supplemented with desired lysine and methionine. Counter part of each diet having enzyme mixture (cellulase 300000 IU, B glucanase 2,50,000 IU, Xylanase 300000 IU, Lipase 14000 IU and amylase 75,000 IU) at level of E_0 (without enzyme), E_1 (25g/100 kg) and E_2 (50 g/100 kg). All diets containing 22 % CP in starter phase and 21% CP in finisher phase. Feed intake (FI) and body weight were significantly (P<0.05) higher in 7 % CF diet than 5% and 9% CF diet. E_1 and E_2 enzymes in each CF diet significantly (P<0.05) improved feed intake and body weight. Treatment $CF_3 \times E_2$ had higher feed intake with non significant difference from $CF_3 \times E_1$ and $CF_2 \times E_2$. Body weight was higher in $CF_2 \times E_2$ with non significant difference from $CF_2 \times E_1$ and CF3×E2. Increasing crude fiber level significantly (P<0.05) increases intestinal length, weight and viscosity whereas enzyme supplementation exerted counter effect on these traits. Excreta moisture increased significantly in 7% and 9% CF diet and decreased with enzyme supplementation. Income over feed cost was highest in $CF_2 \times E_1$ (Rs. 48.60) and lowest in $CF_3 \times E_0$ (Rs.39.28) treatment.

Introduction

Soybean meal (SBM) is conventionally used protein source in poultry ration is costly ingredient hence some other oil cake is often used with it to reduce cost of feed. Sun flower meal (SFC) is good source of protein but could be included in lower level due to its high fiber contents (Senkoylu and Dale, 2006). Its oil seed is rich in methionine, α tocopherol, linolic acid, Ca, P and cysteine (Panda *et al.*, 2004). In expeller dehulled SFC, crude fiber may be lowers up to 12 % and Crude protein (CP) content higher up to 32%. Uses of NSP enzyme breakdown complex NSP content and increase caloric content of feed by 100-200 kcal/kg (Raza *et al.*, 2009) and make easy access of endogenous proteolytic enzyme to digest plant protein. Inconsistent results are reported in literature regarding feeding of varying levels of crude fibre (CF) with enzyme supplementation on performance of broiler. The present study was therefore planning to investigate the effect of varying CF level by inclusion of SFC with or without commercial enzyme supplementation on performance of broilers.

Materials and Methods

One hundred eighty day old coloured commercial broiler chicks were randomly divided into nine dietary treatment groups. Each group had 20 birds in two replicates. Corn SBM based diet containing 5% CF was replaced with SFC (20% and 40%) to prepare 7 % and 9% CF diets. All diets containing 22 % CP in starter phase and 21% CP in finisher phase. Each CF diet was supplemented with 3 levels of enzyme mixture i.e. E_0 (without enzyme), E_1 (25g/100kg) and E_2 (50 gm/100kg) in a factorial designed experimentt. Commercial enzyme mixture containing cellulase 300000 IU, β glucanase 25,0000 IU, xylanase 300000 IU, lipase 14,000 IU and amylase 75,000 IU. All diets were analysed for crude fiber contents protein and energy as per method (AOAC, 1995). SFC utilized in this study containing 13% CF, 37% protein and 2230 kcal ME/ kg. Ingredients and supplements used in ration were maize, SBM, SFC, FM, mineral mixture, vitamin premix, LSP, DCP, methionine, lysine, chlorine chloride and coccidiostate. Weekly body weight and feed intake measured upto 6 weeks of age. At 6 week 2 males and 2 females were slaughtered from each replicate as per standard procedure, intestine was removed after ligation at two sides and its length measured in cm from meckle’s diverticulum to iliocaecal junction and content of intestine was collected in glass vials, laced in icebox and empty weight of intestine was recorded and expressed as g. Homogenized digesta (2g) was taken in centrifuge tube containing 10 ml of distilled water and centrifuged at 5000 rpm/15 minuts. The relative viscosity of digesta supernatant was measured as kinetic viscosity in centi stroke by Oswal U tube viscometer as per Choct and Annison (1992). Excreta moisture was determined by collecting representative sample of excreta from each replicate on last day of experiment by spreading polythene sheet on litter and its moisture estimated as per method (AOAC, 1995). Collected data analysed as per Snedecor and Cochran (1994).

Results and Discussion

Feed intake

Feed intake was significantly ($P<0.05$) high in 7% CF diet ($CF_2 \times E_0$) than 5% CF ($CF_1 \times E_0$) and 9% CF ($CF_3 \times E_0$) diet. Increased NSP content in ration causes dilution of energy which result in higher FI of birds in 7 % CF diet. However, increasing CF up to 9% shown decreased FI of birds attributed to decreased palatability, increased bulkiness and viscosity in intestine result in impaired digestion and absorption of nutrients. The result was in agreement to Austin *et al.*, (1999) and Naqui and Nadeem (2006). In each CF level supplementation of enzyme at E_1 and E_2 level result in significantly higher ($P<0.05$) feed intake than E0 without enzyme diet. This was in agreement with the fining of Swain et al (1996) and Nadeem *et al*., (2005). Enzymes causes disruptions in grain cell wall, increases nutrient availability, improve growth and feed intake of birds (Salin *et al.*, 1991). Overall interaction results shown significantly higher FI in $CF_3 \times E_2$ with non significant difference from $CF_3 \times F_1$ and $CF_2 \times E_2$ and significant from all other combinations.

Body weight

Dietary energy in 7% CF diet and 9 % CF diet were 5.48% and 7.49% lower than 5% CF diet. Compensation of lower energy with higher FI and supplementation of lysine methionine result in significantly (P<0.05)higher body weight in 7 % CF diet (CF_2×E0) than 9 % (CF_3×E_0) and 5 % CF (CF_1×E_0) diets. Elzubair *et al.*, (1991), Rama rao et al (2009) reported higher body weight in 7 % CF diet prepared with inclusion of SFC with SBM and supplemented with lysine and methionine. Similar fining with low energy 7% CF diet was reported by Channegowda *et al.*, (2001). The present finding was in agreement to these authors. Lower body weight in 9 % CF diet might be due to decreased feed intake and increased digesta viscosity, consequently decreased digestion and utilization of nutrients. Supplementation of E_1 and E_2 enzymes in CF_1, CF_2 and CF_3 diets improved body weight significantly (P<0.05) over its respective without enzyme diets i.e. CF_1×E_0, CF_2×E_0 and CF_3×E_0. Higher body weight in enzymes supplemented diet was in accordance with the result of Garcia et al (2003) and Suman *et al.*, (2009) (Table 1).

Table.1 Effect of crude fibre and enzymes on feed intake, body weight and Intestinal parameters of colour broilers

Treatments	Feed intake (g)	Body weight (g)	Intestinal length (cm)	Intestinal weight (g)	Digesta viscosity	Excreta moisture (%)
CF_1XE_0	3078.7^{e}	1362.3^{d}	11.24^{d}	4.19^{d}	1.28^{c}	71.38^{abc}
CF_2XE_0	3264.8^{c}	1420.5^{c}	12.71^{b}	5.20^{b}	1.36^{b}	74.25^{de}
CF_3XE_0	3036.0^{e}	1300.0^{e}	13.18^{a}	5.34^{a}	1.42^{a}	75.75^{e}
CF_1XE_1	3135.0^{d}	1399.0^{c}	11.14^{d}	4.18^{d}	1.23^{f}	69.38^{a}
CF_2XE_1	3290.3^{b}	1467.8^{ab}	12.03^{c}	4.89^{c}	1.26^{cde}	71.25^{abc}
CF_3XE_1	3365.0^{b}	1456.5^{b}	12.15^{c}	4.88^{c}	1.28^{c}	72.50^{cd}
CF_1XE_2	3145.5^{d}	1410.5^{c}	10.96^{d}	4.11^{d}	1.23^{f}	70.00^{ab}
CF_2XE_2	3368.5^{ab}	1484.0^{a}	11.96^{c}	4.84^{c}	1.24^{ef}	70.00^{ab}
CF_3XE_2	3398.6^{a}	1465.0^{ab}	12.11^{c}	4.86^{c}	1.25^{def}	72.00^{bc}

Means in a column with uncommon superscripts are significant (P<0.05)

Table.2 Economics of rearing colour broiler fed high fibre diet with and without enzyme

Treatment	Starter phase (0-3 weeks)			Finisher phase (4-6 weeks)			Total feeding cost	Sale of birds @Rs. 100/kg	Income over feeding cost (Rs.)
	Feed Intake (kg)	Feed cost/kg (Rs.)	Feeding cost (Rs.)	Feed cost per kg (Rs.)	Feed intake (kg)	Feedin g cost (Rs.)			
CF_1XE_0	0.975	31.10	29.34	30.39	2.10	63.97	93.25	136.2	42.95
CF_2XE_0	1.033	30.32	31.32	29.48	2.23	65.74	97.06	142.0	44.94
CF_3XE_0	0.956	31.51	30.09	29.20	2.08	60.73	90.82	130.0	39.28
CF_1XE_1	0.977	30.21	30.49	30.50	2.15	60.57	96.06	139.9	43.84
CF_2XE_1	1.134	31.43	34.50	25.59	2.15	63.61	98.11	146.7	48.60
CF_3XE_1	1.004	31.62	31.74	29.31	2.36	69.17	100.91	145.6	44.70
CF_1XE_2	1.023	31.32	32.04	30.61	2.12	64.89	96.93	141.0	44.07
CF_2XE_2	1.069	30.54	32.64	29.70	2.29	68.01	100.65	148.4	44.75
CF_3XE_2	1.025	31.73	32.52	29.42	2.37	69.72	102.24	146.5	44.20

Overall interaction results shown highest body weight in $CF_3 \times E_2$ with non significant difference from $CF_2 \times E_1$ and $CF_2 \times E_2$. Significant CF x Enzyme interaction for body weight was reported by Shrivastava *et al*., (2005). Intestine parameters significantly (P<0.05) higher intestinal length (l) and Weight (wt.)with increasing CF in diet was in agreement with the result of Ikegami *et al*., (1990) and Berwal *et al*., (2008). Enzyme supplementation in 5% CF diet did not cause any difference in length and weight of intestine i.e. $CF_1 \times E_0$, $CF_1 \times E_1$ and $CF_1 \times E_2$ were similar whereas in 7% and 9% CF diets, E_1 and E_2 enzyme supplementation result in significantly decreased length and weight of intestine than its respective without enzyme diets ($CF_2 \times E_0$ and $CF_3 \times E_0$). This finding was in agreement with Berwal *et al*., (2008) and Barathidhasan *et al*., (2009). Interaction results shown significantly (P<0.05) highest length and weight of intestine in $CF_3 \times E_0$ and lowest in $CF_1 \times E_2$ with non significant difference from $CF_1 \times E_0$ and $CF_1 \times E_1$. Intestinal viscosity (vs) increased significantly (P<0.05) with increasing CF levels from $CF_1 \times E_0$ to $CF_2 \times E_0$ and $CF_3 \times E_0$. The result was in accordance with Nisha (2005), Udeybir *et al*., (2007), Rajesh *et al*., (2006) and Berwal *et al*., (2008). Overall interaction result shown significantly higher intestinal viscosity in $CF_3 \times E_0$ and significantly lowest in $CF_1 \times E_1$, $CF_1 \times E_2$, $CF_3 \times E_2$ with non significant difference between them. Excreta moisture increased significantly (P<0.05) with increasing dietary crude fibre from 5% ($CF_1 \times E_0$) to 7% ($CF_2 \times E_0$) and 9% ($CF_3 \times E_0$). E_1 and E_2 enzyme supplementation significantly decreased excreta moisture in 7% and 9% CF diet than its without enzyme diets ($CF_2 \times E_0$ and $CF_3 \times E_0$). The result was in collaboration with Nisha (2005) and Udeybir et al (2007). Supplementation of enzyme significantly decreased intestinal viscosity. Similar effect of enzymes on intestinal viscosity was reported by Rajesh *et al*., (2005) and Berwal *et al*., (2008). Overall interaction shown highest excreta moisture in $CF_3 \times E_0$ and lowest in $CF_1 \times E_2$. Economics of rearing is presented in Table 2. Economics of feeding cost rearing upto 6 week was found highest in $CF_3 \times E_2$ (Rs. 102.24) and lowest in $CF_3 \times E_0$ (Rs. 90.82). Income per bird on sale was higher in $CF_2 \times E_2$ (Rs. 148.40) and subsequent to this was $CF_2 \times E_1$ (Rs. 146.70) and $CF_3 \times E_2$ (Rs.146.40). Gross return over feeding expenditure was highest in $CF_2 \times E_1$ (Rs. 48.60) and lowest in $CF_3 \times E_0$ (Rs. 39.28).

In conclusion the feed intake (FI) and body weight were significantly (P<0.05) higher in 7 % CF diet than 5% and 9% CF diet. E_1 and E_2 enzymes in each CF diet significantly (P<0.05) improved feed intake and body weight. Treatment CF_3x E_2 had higher feed intake with non significant difference from $CF_3 \times E_1$ and $CF_2 \times E_2$. Body weight was higher in $CF_2 \times E_2$ with non significant difference from $CF_2 \times E_1$ and CF3×E2. Increasing crude fiber level significantly (P<0.05) increases intestinal length, weight and viscosity whereas enzyme supplementation exerted counter effect on these traits. Excreta moisture increased significantly in 7% and 9% CF diet and decreased with enzyme supplementation. Income over feed cost was highest in $CF_2 \times E_1$ (Rs. 48.60) and lowest in $CF_3 \times E_0$ (Rs.39.28) treatment.

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