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Efficacy of Crude Soya oil and Emulsifier in Ration on Production Performance of Broilers

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ABSTRACT

This study was conducted to assess the efficacy of emulsifier in broiler ration containing crude soya oil on the production performance of broilers. A total of 90 day- old Vencobb 320 broiler chicks were randomly divided into 15 groups of six birds in each and five groups were allocated to each dieary treatment. Treatment groups were fed with basal diet contains crude soya oil as energy source (T_1), basal diet supplemented with fat emulsifier at the rate of 250 g per metric tonne of feed (T_2) and 80 kcal energy reduced from basal diet supplemented with emulsifier at the rate of 250 g per metric tonne of feed (T_3). All the chicks were reared under deep litter system for 42 days. Body weight and feed intake were recorded weekly. Body weight (6^{th} week) of T_2 birds (2622 g) was comparable with T_3 (2558 g) but was higher ($P<0.05$) than in T_1 (2502 g). Similarly feed conversion ratio (6^{th} week) was also similar between T_3 (1.76) and T_2 (1.80) birds, however T_1 (1.87) had lower ($P<0.05$) FCR than in T_3 group. Dressing percent was higher ($P<0.05$) in T_1 (69.44) than occurred in T_3 (65.47) and T_2 (65.55). Abdominal fat percentage, breast meat yield and drumstick percentage, serum biochemical attributes were not different among three bird groups. The present study concluded that inclusion of emulsifier at the rate of 250 g / MT of feed containing crude soya oil with 80 kcal reduced metabolic energy improved body weight and feed conversion ratio at market age

Key words: Crude soyabean oil, Feed conversion ratio, Fat emulsifier

INTRODUCTION

Several oils are used in the broiler ration as a source of energy and amount of oil in broiler ration depends on several factors such as availability, relative price and the effect on feed manufacturing process. Energy is a major cost component in diets of as broilers for higher performance and Emulsifiers can be used to improve fat digestibility and energy efficiency. Low energy diets can be formulated for birds to maintain performance, leading to lower feed cost, more economical and sustainable production. Emulsifiers facilitate the formation of emulsion droplets, which lowers the surface tension and stimulates the formation of micelles, causes high levels of monoglycerides in the intestine and facilitates the nutrient transport through the membrane allowing improved nutrient absorption and utilization (Ashraf, 2007; Melegy *et al.,* 2001). However, Emulsifier supplementation also increases nutrient digestibility but reduces growth performance and carcass characteristics (Jones *et al.,* 1992; Cooper *et al.,* 1987), which is attributed to the degree of saturation and length of fatty acids. Therefore, this study was undertaken to study the efficacy of emulsifier with crude soya oil as fat source on the metabolic energy sparing effect in the production performance of broilers.

MATERIALS AND METHODS

A total of 90 day-old Vencobb- 320 broiler chicks belonging to single hatch were purchased from a local hatchery, were wing banded, weighed and randomly distributed into 15 groups of six in each and allocated to three treatments, 5 groups in each treatment. Feed and water were provided *ad lib.* All the chicks were reared hygienically on deep litter system in separate pens under standard uniform managemental conditions for 42 days. The fat emulsifier Jubidol® used was purchased from Jubliant Life Sciences, Noida. The treatment groups were divided as basal diet containing crude soya oil (T_1), basal diet supplemented with fat emulsifier at the rate of 250 g per MT of feed (T_2) and 80 kcal energy reduced from basal diet with emulsifier supplementation (T_3). The Isonitrogenous experimental

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Table 1. Ingredients and chemical composition of broiler Pre starter, Starter and Finisher ration(%)

Ingredients (kg/100kg)	BPS			BS			BF		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
Maize	50.20	50.20	52.5	52.18	52.18	54.00	61.57	61.7	63.53
Soya	41.80	41.80	40.6	38.80	38.80	38.52	31.93	31.93	31.60
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Calcite	1.20	1.20	1.35	0.98	0.98	0.98	1.44	1.44	1.45
DCP	1.81	1.81	2.04	2.00	2.00	2.00	1.05	1.05	1.05
Soya oil	3.43	3.43	2.0	4.80	4.80	3.30	2.73	2.73	1.21
Methionine	0.32	0.32	0.30	0.23	0.23	0.20	0.17	0.17	0.16
Lysine	0.22	0.22	0.21	0.11	0.11	0.08	0.10	0.10	0.08
Vitamin premix	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Mineral premix	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nutrient composition (calculated)									
CP (%)	23.0	23.0	23.0	22	22	22	20	20	20
Crude fiber (%)	3.51	3.51	3.48	3.37	3.37	3.39	3.15	3.15	3.16
Ether extract(%)	5.78	5.78	4.47	7.14	7.14	5.74	5.45	5.45	4.04
Metabolizable energy	3000	3000	2920	3100	3100	3020	3200	3200	3120

BPS- Broiler pre starter, BS- Broiler starter and BF- Broiler finisher; Supplies per kg of diet vitamin A 16,500 IU, vitamin D_3 3200 ICU, vitamin E 12mg, vitamin K 2 mg, vitamin B_2 10 mg, vitamin B6 2.4 mg, vitamin B_{12} 12 µg, niacin 18mg, pantothenic acid 12 mg, Mn 90 mg, Zn 72 mg, Fe 60 mg, Cu 10 mg, Iodine 1.2 mg

diets were prepared (Table 1) as per Bureau of Indian Standards (BIS, 1992). Cumulative body weight and cumulative feed consumption were recorded weekly. Blood samples were collected at the end of the experiment from wing vein of birds in sterile tube and serum was separated using centrifuge for estimation of uric acid (mg/dl), creatinine (mg/dl), total protein (g/dl), albumin (g/dl), globulin (mg/L), alanine aminotransferase (ALT) (IU/L), aspartate aminotransferase (AST) (IU/L), triglycerides (mg/dl), total cholesterol (mg/dl) and high density lipoprotein (HDL). At the end of experiment, three birds from each replicate were selected randomly and slaughtered ethically by mechanical stunning followed by exsanguinities to study the dressing percentage, breast percentage, drumstick percentage and abdomen fat percentage. Data were analysed using completely randomized design with one way analysis of variance as per the procedures of Snedecor and Cochran (1989) using statistical analysis system (IBM SPSS Version 20.0 for windows).

RESULTS AND DISCUSSION

Cumulative body weight at 1st, 3rd, 5thand 6th week of age was different (P<0.05) among three groups (Table 2). During first week of age, emulsifier included treatment groups (T_2 and T_3) had shown significantly higher body weight (188.14 g and 181.44 g) as compared to body weight of 172.78 g in birds fed basal diet (T_1). There was no significant difference in body weight of chicks among three groups during 2nd of week of age. At 6th week of age highest body weight was recorded in T_2 group (2622 g), followed by T_3 (2558 g) and T_1 (2502 g) group, which agreed favourably with results of Zollistsch *et al.* (1997) who reported better body weight in birds fed soyabean oil added with emulsifier as compared to blend of vegetable oil and animal fat.

Cumulative feed intake was similar (Table 2) among the treatment groups but numerically lowered feed intake was noticed in T_3 group at 6th week of age, whereas cumulative feed conversion ratio was different (P<0.05) among the treatment groups.

Table 2. Effect of supplementation of emulsifier on production performance

Age(weeks)	Cumulative body weight (g)			Cumulative feed intake (g)			Cumulative FCR		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
Hatch weight	48.96± 0.9	48.3± 1.4	47.26± 0.4						
1	172.78^{a}± 2.3	188.14^{b} ±0.5	181.44^{c}± 0.6	138.20± 2.9	146.80± 2.7	145.60± 3.1	1.12± 0.01	1.059± 0.02	1.09± 0.02
2	447.14± 6.8	457.24± 2.3	449.96± 0.9	486.80^{b}± 5.3	476.20^{ab}± 4.5	468.80^{a}± 3.2	1.22 ^{b}± 0.01	1.16^{a}± 0.01	1.16^{a}± 0.01
3	765^{a}± 16.5	784^{ab}± 13.8	833.40^{b}± 28.2	1019.38± 6.9	992.54± 18.3	1027.10± 27.9	1.40 ^{b}± 0.01	1.30^{ab}± 0.02	1.30^{a}± 0.02
4	1270± 17.5	1277± 7.8	1276.20± 15.7	1880.78^{b}± 19.7	1813.78^{ab}± 33.7	1768.70^{a}± 20.2	1.54^{b}± 0.01	1.47^{ab}± 0.03	1.43^{a}± 0.01
5	1772^{a}± 27.7	1927^{b}± 34.8	1832^{a}± 28.8	2852.98^{a}± 43.5	3056.78^{b}± 62.9	2807.30^{a}± 39.7	1.65^{b}± 0.02	1.63^{ab}± 0.03	1.57^{a}± 0.02
6	2502^{a}± 28.9	2622^{b}± 20.5	2558^{ab}± 24.3	4574.98± 107.7	4638.78± 45.0	4422.30± 36.3	1.87^{b}± 0.02	1.80 ^{ab}± 0.02	1.76^{a}± 0.01

Mean with different superscript in a row differ significantly (P<0.05) between treatments

Improved feed conversion ratio may be due to effect of fat emulsifier which improved fat digestibility. Exogenous emulsifiers in broiler chicks diets have been reported to improve digestibility, body weight, FCR, weight gain and abdominal fat (Roy *et al.,* 2010) and inlcusion of soya bean oil with emulsifier imroved FCR in broiler diet (Neto *et al.,* 2011).

Dressing percentage was comparable between T_3 (65.47%) and T_2 (65.55%), which was lower (P<0.05) than occurred in T_1 (69.44%) group (Table 3). Abdominal fat percentage, breast meat yield and drumstick percent were similar among three groups. Similarly, Aguilar *et al.* (2013) reported similar carcass traits, abdominal fat and breast weight and yield when exogenous emulsifier fed with palm oil in broilers. Roy *et al.* (2010) also reported that exogenous emulsifier supplementation did not affect the carcass traits.

Serum concentrations of uric acid (mg/dl), creatinine (mg/dl), total Protein (g/dl), albumin (g/dl), globulin (mg/dl), ALT (IU/L), AST (IU/L), triglycerides (mg/dl), total cholesterol (mg/dl) and HDL cholesterol (mg/dl) and glucose (mg/dl) were similar in three groups (Table 4). The results of this study agree favourably with Neto *et al.* (2011), who reported that total cholesterol, HDL or triglycerides concentrations were not affected by dietary fat source and emulsifier addition. Response in serum biochemical parameters may be related to the type of fat source whether

Table 3. Effect of supplementation of emulsifier with crude soyabean oil on carcass studies

Parameters	Treatment 1	Treatment 2	Treatment 3
Dressing %	69.44^{b}±0.34	65.55 ^{a}±0.1	65.47 ^{a}±1.10
Breast %	25.28±1.39	23.04±0.85	21.75±0.45
Drum stick %	0.55±0.11	0.76±0.32	0.90±0.18
Abdomen fat %	9.61±0.22	9.42±0.42	8.98±0.02

Mean with different superscript in a row differ significantly (P<0.05)

Table 4. Effect of supplementation of emulsifier with crude soyabean oil on serum biochemical parameters

Parameters	Treatment 1	Treatment 2	Treatment 3
Uric acid, mg/dL	7.20±0.74	6.74±0.83	6.06±0.54
Creatinine, mg/dL	0.72±0.04	1.28±0.52	0.73±0.09
Total protein, g/dL	5.61±0.35	4.98±0.34	5.11±0.32
Albumin, g/dL	1.71±0.01	1.57±0.08	1.68±0.07
Globulin mg/L	3.90±0.34	3.41±0.29	3.43±0.26
ALT, IU/L	14.0±6.55	21.86±8.13	5.63[a]±1.66
AST, IU/L	338.89±59.69	281.33±16.94	351.50±29.91
Triglycerides, mg/dL	54.29±8.10	68.13±9.35	45.88±7.08
Total cholesterol, mg/dL	156.22±10.96	146.10±32.24	138.25±11.13
HDL-cholesterol mg/dL	53.45±3.81	44.83±9.07	48.59±4.70

vegetable oil or animal source and their inclusion level and multiple potential mechanisms were involved in the regulation of serum cholesterol (Bontempo *et al.,* 2018).

CONCLUSION

Results of this study concluded that the inclusion of emulsifier at the rate of 250 g/ T of feed containing crude soya with 80 kcal reduced metabolic energy improved body weight and feed conversion ratio in broilers at market age.

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