

## Effect of the Replacement of Soybean Meal by Rubber Seed Meal on Growth, Economics and Carcass Characteristics of Broiler

Research Article

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### ABSTRACT

The experiment was to study the effects of replacing soybean meal by rubber seed meal on growth, economics and carcass characteristics of broiler. A total of 150 day-old commercial broiler (Cobb-500) was reared for a period of 35 days. There were five treatments including T<sub>0</sub> (without rubber seed meal), T<sub>1</sub> (10% rubber seed meal), T<sub>2</sub> (20% rubber seed meal), and T<sub>3</sub> (30% rubber seed meal) and T<sub>4</sub> (40% rubber seed meal) and each dietary treatment group consists of 30 chicks under two replicated pens (R<sub>1</sub> and R<sub>2</sub>). Chickens had freely access to feed and water throughout the experiment. Body weight was taken at weekly basis. Feed was measured from each replication at weekly interval for the determination of feed intake of birds. At the end of the experiment the carcasses quality was studied. At the age of 5th week, the average body weight and body weight gain of the broilers were not significantly ( $P < 0.05$ ) differed between the treatments. Significant differences were found in feed conversion ratio (FCR) value between treatments and highest FCR was found in T<sub>2</sub> ( $1.656 \pm 0.055$ ) where used 20% of rubber seed meal (RSM) than others. There was no toxic or detrimental effect of rubber seed meal found in broiler production. The highest dressing percentage ( $60.51 \pm 0.097$ ) was found in T<sub>1</sub> (10% RSM) and the lowest ( $54.40 \pm 1.166$ ) was in T<sub>4</sub> (40% RSM). Therefore it could be concluded that, soybean meal might be replaced by the RSM at 10-20%.

**KEY WORDS** broiler, growth and carcass characteristics, rubber seed meal, soybean meal.

### INTRODUCTION

Soybean meal is using in the broiler ration up to 30% as a protein source ingredients. Soybean meal contains 38-40% protein and 18-20% fat and it is the excellent source of lysine, tryptophan and threonine (Banaszkiewicz, 2011; Reddy and Bhosale, 2001). However, the cost of soybean meal is increasing day by day and it increases the total feeding cost of broiler. In addition persistent shortages of the conventional feedstuffs for livestock feeding in the developing countries are caused largely by inadequate production of farm crops to meet the needs both of humans and of their

domestic animals. Therefore, it is a challenged to prepare a good ration by inoculation of non-conventional feed ingredient for minimizing the feed costs. The non-conventional feed resources refer to all those feeds that have not been traditionally used in animal feeding and or / are not normally used in commercially produced rations. One of the non-conventional feed resources is rubber seed meal, which are obtained from rubber tree seed (*Hevea brasiliensis*). The average nutrient composition of rubber seed meal was ash 3.10%, neutral detergent fiber (NDF) 53.8%, crude fat 28.4% and nitrogen 2.39% in dry basis (Chhay Ty and Phiny, 2001). In addition these seeds are very rich in oil and

are produced in quantities of approximately 5 kg/tree annually (Bressani *et al.* 1983). Rubber seed meal has a high level of lysine and tryptophan, making it a good companion for maize in poultry and pig rations (Ensminger and Olenine, 1978). Despite its potential as a protein feed for animals, fresh rubber seeds contain a toxic factor, cyanogenic glucoside, which contain is about 200 mg/100 g of fresh seeds (Giok *et al.* 1967). Detoxification of fresh rubber seed can be carried out by storage of fresh seed for 5-6 months before oil extraction. Furthermore the cyanide content of the seeds decreased from 82.5 to 29.3 mg/kg DM in approximately 45 days of storage (Chhay Ty and Phiny, 2001). However, the information regarding the effect of this unconventional seed as feed on broiler performance is limited. Therefore, the experiment was undertaken with the objectives (i) to know the effects of feeding rubber seed meal instead of soybean meal on productive performance of broiler; (ii) to assess the comparative effects of supplementing soybean meal and rubber seed meal in the ration of broiler regarding feed intake, growth performance, carcass quality, dressing percentage and economics of broiler and (iii) to examine the effect of the rubber seed meal on chemical composition of broiler meat.

## MATERIALS AND METHODS

The experiment was conducted in the Animal Nutrition Laboratory at Chittagong Veterinary and Animal Science University, Bangladesh from October to December, 2012 on Cobb 500 broilers.

### Collection and preparation of rubber seed and broiler chick

Rubber seed was collected from a privet rubber garden of Balakata, Banderban, Chittagong, Bangladesh. The seeds were sun dried for 8 to 10 days. Then the seeds were crushed in blender machine to produce the rubber seed meal (RSM). A total of 150 day-old commercial broiler chicks (Cobb 500 strain) were purchased from an agent of Kazi Hatchery, Chittagong, Bangladesh.

### Layout of the experiment

Chicks were equally and randomly divided and distributed in to five dietary treatment groups (T<sub>0</sub> (without RSM), T<sub>1</sub> (10% RSM), T<sub>2</sub> (20% RSM), T<sub>3</sub> (30% RSM) and T<sub>4</sub> (40% RSM)) having two replication in each. Each dietary treatment group consists of 30 chicks, distributed in two replicated pens.

### Brooding of baby chicks

The experiment was conducted in winter season. The ambient temperature was very low during this period. The chicks will be brooded in respective pens at a temperature of 90-95

°F during 1<sup>st</sup> week, 90-85 °F during 2<sup>nd</sup> week, and 85-80 °F during 3<sup>rd</sup> week with the help of electric light for maintaining proper temperature.

### Medication and vaccination

At first week Gluco-C® was used @ 50 gm/L water. From 1<sup>st</sup> day megavit® WS was used @ 1 gm/5 L water. The birds were vaccinated against Newcastle and Gumboro diseases on the 5<sup>th</sup> and 10<sup>th</sup> day followed by a booster dose on 18<sup>th</sup> and 26<sup>th</sup> day.

### Chemical analysis

The feed ingredients and the broiler meats were analyzed to determine their proximate components as AOAC (1980) method in the Animal Nutrition Laboratory, Department of Animal Science and Nutrition and Poultry Research and Training Centre (PRTC) of Chittagong Veterinary and Animal Science University, Chittagong.

### Effects of feeding rubber seed meal on body weight gain and feed intake and costs benefits

The chicks hatched out weight was taken and recorded. Two types of ration (broiler starter and broiler finisher) was formulated and prepared (Table 1 and 2). Starter ration was given from 1 to 21 days where rubber seed meal (RSM) were supplied half proportion of finisher ration and the finisher ration was given from 22 to 35 days. Feed was supplied *ad libitum* along with fresh and clean drinking water. Weekly body weight was taken using top loading balance and recorded and final body weight and weight gain of broiler was calculated from this recorded information. The average feed intake of the broilers was calculated from the differences between the supplied and leftover. The feed costs per treatment and per broiler were calculated from the available market price and finally costs benefit was calculated.

### Evaluation of carcass characteristics

Experimental birds were slaughtered after 35 days of feeding trial to assess the carcass quality. Four birds were taken from each treatment group to measure the selected quality. Before slaughtering the birds were kept in fasting condition for 24 hours. Just before slaughtering the birds were weighed and slaughtered according to Halal method. Data were recorded in terms of live weight, breast meat weight, thigh bone weight, thigh meat weight, drumstick meat weight, drumstick bone weight, skin weight, abdominal fat weight, digestive tract weight, liver weight, gizzard weight, shank weight, heart weight, head weight, neck weight, spleen weight and wing weight. The dressing percentage was calculated as:

Dressing percentage = weight of the carcass / weight of live animal

**Table 1** Ingredients composition and nutritive value of the starter ration (0-21 days)

Ingredients (kg/100 kg)	Treatment				
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Maize	57.76	56.76	56.76	56.26	54.558
Rice polish	3.8	3.8	3.8	3.8	5
Soybean oil	2	2	2	2	3
Protein concentrate	5.5	6.5	6.5	7	6.5
Rubber seed	.	1.5	2.85	4.28	5.7
Soybean meal	28.5	27	25.65	24.22	22.8
Lime stone	1.2	1.2	1.2	1.2	1.2
Dicalcium phosphate	0.5	0.5	0.5	0.5	0.5
L-lysine	0.05	0.05	0.05	0.05	0.05
DL-methionine	0.16	0.16	0.16	0.16	0.16
Vitamin mineral premix	0.25	0.25	0.25	0.25	0.25
Antioxidant	0.01	0.01	0.01	0.01	0.012
Coccidiostat	0.02	0.02	0.02	0.02	0.02
Common salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
<b>Estimated chemical composition</b>					
Metabolizable energy (kcal/kg)	3001.10	2999.894	3003.674	3005.633	3063.534
Crude protein (g/100 g)	22.04	22.26517	22.00962	21.99292	21.41033

T<sub>0</sub>: diet without rubber seed meal (RSM); T<sub>1</sub>: diet with 5% RSM; T<sub>2</sub>: diet with 10% RSM; T<sub>3</sub>: diet with 15% RSM and T<sub>4</sub>: diet with 20% RSM.

Vitamin mineral premix provided the following per kg diet: vitamin A: 5000 IU; D<sub>3</sub>: 1000 IU; E: 8 IU; K: 1.6 mg; B<sub>1</sub>: 1 mg; B<sub>2</sub>: 2 mg; B<sub>3</sub>: 16 mg; B<sub>5</sub>: 5 mg; B<sub>6</sub>: 1.6 mg; B<sub>9</sub>: 320 µg; B<sub>12</sub>: 4.8 µg; H: 40 mg; Cu: 4 mg; Mn: 40 mg; Zn: 20 mg; Fe: 2.4 mg and I: 160 µg.

**Table 2** Ingredients composition and nutritive value of the finisher ration (22-35 days)

Ingredients (kg/100 kg)	Treatment				
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Maize	59.3	57	57.2	56.56	55.76
Rice polish	4.06	5.01	4	4	3.6
Soybean oil	3.7	3.75	3.5	3.5	3.5
Protein concentrate	2	3	4.16	5	6.2
Rubber seed	-	2.85	5.7	8.5	11.5
Soybean meal	28.5	25.65	23	20	17
Lime stone	1.2	1.5	1.2	1.2	1.2
Dicalcium phosphate	0.5	0.5	0.5	0.5	0.5
L-lysine	0.05	0.05	0.05	0.05	0.05
DL-methionine	0.16	0.16	0.16	0.16	0.16
Vitamin mineral premix	0.25	0.25	0.25	0.25	0.25
Antioxidant	0.01	0.01	0.01	0.01	0.01
Coccidiostat	0.02	0.02	0.02	0.02	0.02
Common salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
<b>Estimated chemical composition</b>					
Metabolizable energy (kcal/kg)	3109.03	3102.28	3102.96	3109.5	3114.48
Crude protein (g/100 g)	20.1137	20.0757	20.2204	20.0455	20.0764

T<sub>0</sub>: diet without rubber seed meal (RSM); T<sub>1</sub>: diet with 10% RSM; T<sub>2</sub>: diet with 20% RSM; T<sub>3</sub>: diet with 30% RSM and T<sub>4</sub>: diet with 40% RSM.

Vitamin mineral premix provided the following per kg diet: vitamin A: 5000 IU; D<sub>3</sub>: 1000 IU; E: 8 IU; K: 1.6 mg; B<sub>1</sub>: 1 mg; B<sub>2</sub>: 2 mg; B<sub>3</sub>: 16 mg; B<sub>5</sub>: 5 mg; B<sub>6</sub>: 1.6 mg; B<sub>9</sub>: 320 µg; B<sub>12</sub>: 4.8 µg; H: 40 mg; Cu: 4 mg; Mn: 40 mg; Zn: 20 mg; Fe: 2.4 mg and I: 160 µg.

### Statistical analysis

All recorded data were statistically analyzed using completely randomized design (CRD). The analyses were performed by SPSS statistical software (SPSS, 2011). The meat was converted to percentage of live weights prior to statistical analysis. Significant differences between means were identified by least significant differences (LSD) at 5% level of significance (Steel *et al.* 1997).

## RESULTS AND DISCUSSION

### Chemical composition of rubber seed meal

Dry matter (DM) percentage of rubber seed meal was 95.7. It contains 26.07% crude protein, 1.8% ash, 4.7% crude fiber and 10.8% ether extract. On the other hand soybean meal contains higher crude protein (45%) and lower ether extracts (2.9%) than rubber seed meal.

Mmereole (2008) analyzed rubber seed meal and found higher crude protein (34.10%) and ash (3.10%) than the current study and similar percentage of crude fiber and fat.

### Effects of rubber seed meal on the production performance and carcass quality of broiler

#### Effect of rubber seed meal on live weight gain of broilers

The body weight gain of broiler containing different level of rubber seed meal shown in Table 3. There was no significant differences in initial body weight and body weight gain among the different treatment ( $P>0.05$ ). The body weight was highest in broiler diet  $T_2$  containing 20% RSM which was 1395.25 g and the lowest (1268.78 g) in dietary treatment  $T_4$  containing 40% RSM. Nouke and Endeley (1989) used 300 Jupiter chickens to observe the effects of incorporating rubber seed meal supplemented with blood meal in broiler rations under traditional conditions. They observed average weekly body weight gain was 103.71 g within 1<sup>st</sup> to 6<sup>th</sup> week using 0% RSM. But in the current experiment the average weekly body weight gain was 261.84 g within 1<sup>st</sup> to 5<sup>th</sup> week using 0% RSM (Table 3). This difference might be due to the differences of broiler strain. Although the final body weight of broilers under different treatment groups was similar but the body weight gain was significantly higher in 10% and 20% RSM groups than control and these values was higher than Duong (2003), who found average daily body weight gain 6.08 g in 10% and 20% RSM treatment groups.

#### Effect of rubber seed meal on feed intake feed conversion ratio (FCR) of broiler

Total feed intake per bird of different dietary treatment is shown in Table 4. Birds of  $T_3$  consumed more feed than others where  $T_0$  intakes lowest amount of feed. There were no significant differences ( $P>0.05$ ) found among the treatments. The average weekly feed intake was 457.264, 461.091, 461.718, 466.759 and 464.324g for  $T_0$ ,  $T_1$ ,  $T_2$ ,  $T_3$  and  $T_4$ , respectively which was higher than Nouke and Endeley (1989). They observed 289.94, 130.70, 189.00, 209.98 g feed intake for the 0, 10, 20 and 30% RSM, respectively as supplemented with blood meal. Hutagalung (1981) observed that the optimum level of rubber seed meal in the ration was 10-30%. However in this experiment, rubber seed meal was used up to 40% of soybean meal and better result was found using rubber seed meal up to 20% of soybean meal. The feed conversion ratio (FCR) of birds (value $\pm$ standard error) is presented in Table 3. The best FCR value (1.65 $\pm$ 0.055) was found in  $T_2$  where we used 20% of rubber seed meal (RSM) and  $T_4$  (40% RSM) gave the worst FCR value (1.83 $\pm$ 0.014). The FCR of  $T_2$  and  $T_1$  was similar.

Duong (2003) found FCR was 2.91 in control group (0% RSM) and 3.00 in  $T_1$  (10% RSM) by rearing native Tam Hoang chickens of vietnam. The growth rate and feed conversion ratio (FCR) are always good in broiler strain Cobb 500 due to their genetics. There it can be seen that 20% rubber seed meal (RSM) had best FCR in broiler.

#### Effect of rubber seed meal on feed cost and profit

Total feed cost per treatment and total feed cost per bird are shown in Table 1. During the experimental period the price of rubber seed was 25 Bangladeshi Taka (BDT)/kg (including processing cost). According to Table 6,  $T_4$  diet required the lower feed cost BDT 86.67  $\pm$  0.409 / kg, where  $T_0$  comprises of higher feed cost BDT 89.83  $\pm$  0.432 / kg and sale price of per kg bird was BDT 135. Net profit per bird was higher in  $T_2$  45.04  $\pm$  3.19 BDT and lower in  $T_4$  (37.28 $\pm$ 0.92 BDT). The ration containing soybean meal ( $T_0$ ) and the net profit was 37.72  $\pm$  1.26 BDT / bird.

#### Effect of rubber seed meal on carcass quality and dressing percentage of broiler

Effects of rubber seed meal on the carcass characteristics and dressing percentage of broilers are given in Table 3. The slaughter data of broiler chicks RSM fed experiment was represented in g/100 g (%) of live weight. No significant ( $P>0.05$ ) effect was observed for carcass weight and weights of internal organs of broilers fed experimental rations except the digestive tract weight and head weight. Rubber seed meal has an effect on digestive tract weight; birds of higher body weight gain have the smaller digestive tract. The breast meat weight was higher in  $T_1$  (16.96 $\pm$ 0.839 g) and lower in  $T_4$  (13.19 $\pm$ 0.971 g). However, higher weight of heart weight, head weight, neck weight and spleen weight were found in control group when compared with broilers in groups fed different level of RSM. Thigh bone weight and gizzard weight are almost same in  $T_0$  and  $T_4$ . Highest gizzard weight found in both  $T_0$  and  $T_4$  is 2.95 g/100 g live weight. Ekenyem and Madubuike (2006) used *Ipomoea asarifolia* leaf meal and found liver weight ranges from 1.435 to 2.125 and gizzard weight 1.475 to 2.85 gm for 0, 5, 10 and 15% IALM.

The highest dressing percentage (60.51 $\pm$ 0.097) was found in  $T_1$  and the lower (54.40 $\pm$ 1.166)  $T_4$  (Table 4). Ekenyem and Madubuike (2006) used *Ipomoea asarifolia* leaf meal (IALM) and found dressing percentage 63.63, 63.41, 63.38 and 62.30 using 0, 5, 10 and 15% IALM, respectively.

#### Effect of rubber seed meal on chemical composition of broiler meat

Results obtained from proximate analysis of meat from five treatment groups shown in Table 5.

**Table 3** Effects of rubber seed meal on the production performance of broiler

Parameters	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	Significance
	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	
Initial body weight (g)	47.9±0.2	46.8±0.09	47.51±0.27	46.43±0.32	47.28±0.09	NS
Final body weight (g)	1355.19±10.465	1436.74±33.465	1442.76±58.9	1348.99±19.665	1316.68±19.18	NS
Weight gain (g/day)	37.38 <sup>a</sup> ±0.301	39.69 <sup>b</sup> ±0.959	39.86 <sup>b</sup> ±1.675	37.22 <sup>a</sup> ±0.553	36.25 <sup>a</sup> ±0.534	*
Feed intake (g)	2286.32±17.42	2305.45±23.96	2308.59±19.02	2333.79±9.84	2321.62±17.35	NS
FCR	1.74 <sup>b</sup> ±0.027	1.65 <sup>a</sup> ±0.022	1.65 <sup>a</sup> ±0.055	1.79 <sup>b</sup> ±0.019	1.83 <sup>c</sup> ±0.014	*
Feed cost/kg (Tk)	39.29±0.106	38.78±0.190	38.02±0.335	37.359±0.595	37.33±1.350	NS
Feed cost/bird (Tk)	89.83±0.432	89.40±0.587	87.79±0.457	87.18±0.232	86.67±0.409	NS
Feed cost per kg broiler (Tk)	68.66±1.077	64.36±0.885	63.01±2.129	66.94±0.711	68.31±0.533	NS
Net profit (Tk/kg live broiler)	37.72±1.26	43.54±1.49	45.04±3.19	39.23±1.11	37.28±0.92	NS

T<sub>0</sub>: indicates broiler without rubber seed meal; T<sub>1</sub>: indicates broiler fed with 10% rubber seed meal; T<sub>2</sub>: indicates broiler fed with 20% Rubber seed meal; T<sub>3</sub>: indicates broiler fed with 30% rubber seed meal and T<sub>4</sub>: indicates broiler fed with 40% rubber seed meal.

\* (P<0.05).

NS: non significant.

The means within the same row with at least one common letter, do not have significant difference (P>0.05).

SE: standard error.

**Table 4** Weekly average daily feed intakes of broilers feed containing rubber seed meal

Age	Daily feed intake (gm/bird)				
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)
1 <sup>st</sup> week	17.495±0.047	17.355±0.136	17.5±0.316	18.14±0.088	17.07±0.044
2 <sup>nd</sup> week	51.895±0.015	51.275±0.610	51.47±0.101	52.1±0.537	51.665±0.800
3 <sup>rd</sup> week	65.8±0.113	66.005±0.357	65.99±0.385	66.575±0.009	66.605±0.003
4 <sup>th</sup> week	83.7±0.196	84.48±0.449	84.405±0.812	85.52±0.101	85.675±0.009
5 <sup>th</sup> week	117.71±1.720	120.225±0.616	120.425±0.104	121.055±0.534	120.625±0.806

T<sub>0</sub>: indicates broiler without rubber seed meal; T<sub>1</sub>: indicates broiler fed with 10% rubber seed meal; T<sub>2</sub>: indicates broiler fed with 20% Rubber seed meal; T<sub>3</sub>: indicates broiler fed with 30% rubber seed meal and T<sub>4</sub>: indicates broiler fed with 40% rubber seed meal.

SE: standard error.

**Table 5** Effect of rubber seed meal on carcass quality and dressing percentage of broiler

Slaughter data (%)	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	P-value	Significance
	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)		
Breast meat weight	16.22±1.740	16.96±0.839	15.52±1.339	14.51±0.573	13.19±0.971	0.306	NS
Thigh bone weight	1.80±0.270	1.56±0.026	1.49±0.226	1.50±0.103	1.80±0.137	0.578	NS
Thigh meat weight	8.64±0.016	8.22±0.241	8.46±0.766	8.17±0.073	7.44±0.322	0.358	NS
Drumstick meat weight	2.80±0.577	3.34±1.062	2.16±0.045	2.67±0.033	3.35±0.959	0.723	NS
Drumstick bone weight	2.80±0.577	3.34±1.062	2.16±0.045	2.67±0.033	3.35±0.959	0.723	NS
Skin weight	7.05±0.521	7.18±0.455	7.41±1.145	6.88±0.289	7.51±0.044	0.942	NS
Abdominal fat weight	1.56±0.477	1.35±0.003	2.18±0.593	2.08±0.084	2.70±0.680	0.361	NS
Digestive tract weight	8.35 <sup>b</sup> ±0.124	7.56 <sup>a</sup> ±0.018	7.61 <sup>a</sup> ±0.051	9.54 <sup>c</sup> ±0.049	10.50 <sup>e</sup> ±0.914	0.015	*
Liver weight	2.30±0.041	2.22±0.011	2.50±0.140	2.41±0.052	2.53±0.227	0.452	NS
Gizzard weight	2.95±0.046	2.81±0.000	2.55±0.151	2.64±0.284	2.95±0.009	0.310	NS
Shank weight	4.92±0.140	4.62±0.340	4.96±0.102	5.03±0.032	5.01±0.130	0.548	NS
Heart weight	0.64±0.125	0.56±0.037	0.62±0.005	0.49±0.044	0.52±0.026	0.451	NS
Head weight	0.64 <sup>b</sup> ±0.075	0.56 <sup>ab</sup> ±0.058	0.62 <sup>b</sup> ±0.049	0.49 <sup>a</sup> ±0.014	0.52 <sup>ab</sup> ±0.026	0.007	**
Neck weight	3.09±0.055	2.55±0.130	2.93±0.180	3.03±0.048	3.00±0.262	0.249	NS
Spleen weight	0.21±0.060	0.14±0.005	0.19±0.019	0.12±0.000	0.10±0.000	0.157	NS
Wing weight	6.94±0.080	6.69±0.075	6.82±0.429	6.97±0.141	6.44±0.395	0.668	NS
Dressing %	58.42 <sup>b</sup> ±1.151	60.51 <sup>c</sup> ±0.097	58.00 <sup>b</sup> ±1.395	57.00 <sup>b</sup> ±0.736	54.40 <sup>a</sup> ±1.166	0.024	*

T<sub>0</sub>: indicates broiler without rubber seed meal; T<sub>1</sub>: indicates broiler fed with 10% rubber seed meal; T<sub>2</sub>: indicates broiler fed with 20% Rubber seed meal; T<sub>3</sub>: indicates broiler fed with 30% rubber seed meal and T<sub>4</sub>: indicates broiler fed with 40% rubber seed meal.

\* (P<0.05) and \*\* (P<0.01).

NS: non significant.

The means within the same row with at least one common letter, do not have significant difference (P>0.05).

SE: standard error.

**Table 6** Chemical composition of broiler meat (g per 100 g DM)

Nutrient	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	Significant
	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	(Mean±SE)	
* DM %	26.21±0.325	25.62±0.079	26.19±0.505	24.92±0.091	26.16±0.860	NS
Ash %	5.23±0.066	5.12±0.015	5.20±0.022	4.96±0.009	5.10±0.092	NS
CP %	89.16±5.148	82.51±0.385	82.07±2.988	77.52±1.438	81.63±1.717	NS
EE %	7.2±0.411	8.1±1.075	9.47±0.265	9.63±0.107	9.88±0.018	NS
CF %	0	0	0	0	0	-

\* Only DM estimated in fresh basis, other components are estimated in DM basis.

DM: dry matter; CP: crude protein; EE: ether extracts and CF: crude fibre.

T<sub>0</sub>: indicates broiler without rubber seed meal; T<sub>1</sub>: indicates broiler fed with 10% rubber seed meal; T<sub>2</sub>: indicates broiler fed with 20% Rubber seed meal; T<sub>3</sub>: indicates broiler fed with 30% rubber seed meal and T<sub>4</sub>: indicates broiler fed with 40% rubber seed meal.

NS: non significant.

SE: standard error.

The result of chemical analysis of meat showing the similar dry matter in all dietary treatment and there was no significant difference ( $P>0.05$ ) among the dietary groups. Maximum dry matter was found in group T<sub>0</sub> (26.21±0.325) and T<sub>3</sub> (24.92±0.091) was minimum. In case of CP% T<sub>0</sub> represents higher value (89.16±5.148) and T<sub>4</sub> represents lower value (81.63±1.717). But in case of EE %, T<sub>0</sub> represent lower value (7.2±0.411) and T<sub>4</sub> represents the higher value (9.88±0.018) and there was no significant difference ( $P>0.05$ ) among the treatment groups. It may be due to the protein percentage and quality of rubber seed meal (26.07%) is lower than soybean meal (45%) whereas the energy value is higher in rubber seed meal (2250 kcl/kg DM) and lower in soybean meal (2240 kcl/kg DM). Broiler meat contains 0% fiber. Adeniyi *et al.* (2011) found 92.21% CP on DM basis which was higher than the present study.

## CONCLUSION

This study reveals that at the age of 5th week the average body weights, feed conversion efficiency, dressing percentage and cost benefit ratios of broiler under 10 and 20% rubber seed meal treated groups were better than other treated groups. Among the 150 experimental broilers only one death occurred and no toxic or detrimental effect of rubber seed meal was found. Therefore it can be suggested that, soybean meal might be replaced by the rubber seed meal at 10-20% in the ration without any bad effect. However, further investigation and experiment will be required with large number of broiler to make a final recommendation.

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