

*Original Research***Evaluation of Raw and Detoxified Rape Seed Meal in Broiler Chicken Diet****Sathyannarayana Nayak, P.*, Krishna Daida, Ravinder Reddy and Basava Reddy P¹**

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Abstract

In order to find out the feasibility of feeding rapeseed (*Brassica napus*) meal to commercial broiler chicken a trial has been conducted using raw and detoxified rapeseed meal. Deoiled rapeseed meal (DRSM) was included in diet on isocaloric and isonitrogenous basis at 14% level untreated and treated with copper sulphate at different levels viz. 0.1, 0.2, 0.3% and fed to a total of 200 day-old commercial broiler chickens from day 1 to 42 days of age. This study revealed that, the body weight gain was significantly ($P < 0.05$) higher in broiler fed with 0.3% CuSO₄ treated DRSM diet compared to the soybean meal control group. There was no significant difference was observed in feed consumption during 0-42 days of age. 0.3% copper sulphate treated DRSM had significantly ($P < 0.05$) better feed conversion. Economics of feeding of DRSM based diets indicated that 0.2 and 0.3% copper sulphate treated DRSM increased returns over feed cost than that of raw DRSM, 0.1% CuSO₄ treated DRSM and control diets. It is concluded that 0.3% CuSO₄ treated deoiled rapeseed meal at 14% level could be safely incorporated in broiler chicken diet.

Key words: Broilers, Copper Sulphate, Rapeseed Meal,

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Introduction

Today, the poultry industry in India is being confronted by the rising cost of feed ingredients and shortage of traditional feed ingredients, which impede the growth of poultry sector. Recently soybean meal rate was shot up to Rs.38-40/kg. In this situation, there is a great need to look for other alternative protein sources for soybean meal. Therefore, constant efforts are being made to search the newer and alternate feed ingredients, their assessment for optimum inclusion in the poultry ration. Partial or complete replacements of protein with alternative protein supplements like rapeseed meal reduce the cost of production. The deoiled rapeseed meal (DRSM) which was found to be rich in crude protein (34.92%)

and a fairly good source of lysine (2.12%) and methionine (0.70%) (Thanaseelaan *et al.*, 2008). However, the use of DRSM is limited by the presence of anti nutritional factors like glucosinolates, other minor anti-nutritional factors like sinapine and tannin. Detoxification of the rapeseed meal by removal/neutralization of these toxic principles offers possible strategy for making it fit for use in poultry diet (Pekel *et al.*, 2009).

Materials and Methods

The effect of dietary inclusion of raw and detoxified rapeseed meal with 0.1, 0.2 and 0.3% copper sulphate solution (1%, w/w), at 14% graded levels in commercial broilers. A total of 200 day old commercial male broiler (*Cobb 400*) chicks were procured, wing banded and weighed individually. The composition of the experimental diet broiler pre starter (1-14days) and starter diets (15-28days) and finisher (29-42days) were formulated *iso-nitrogenous* and *iso-caloric*. Eight replicates were allocated to each of the treatments (5), employing five birds/replicate. The individual body weight of chicks and replicate-wise feed intake were recorded at weekly intervals throughout the experimental period and calculated weekly feed conversion ratio. After 42days of experimentation, feed cost for live weight gain (kg) and returns over feed cost (Rs.) and gain/loss over control (Rs. /bird) were calculated.

Results and Discussion

Body Weight Gain

Overall body weight gains were significantly ($P < 0.05$) higher in treatment fed with 0.3% CuSO₄ treated deoiled rapeseed meal at 14% level (2190.5g). The treatment fed with 0.2% CuSO₄ treated deoiled rapeseed meal was comparable (2024.0g) to control (2053.1g). However, there was significant ($P < 0.05$) growth depression noticed on raw deoiled rapeseed meal (1702.9 g) and 0.1% CuSO₄ treated deoiled rapeseed meal (1792.4 g) at 14% level as compared to that of control during 0-42 d (Table 1).

Table 1: Effect of dietary inclusion of detoxified Rapeseed meal at graded level on body weight gains (g) of commercial broiler chicken.

Type	% in diet	Age in Days					
		0-7	0-14	0-21	0-28	0-35	0-42
Control	0	93.4 ^a	310.1 ^b	729.9 ^a	1165.1 ^b	1596.1 ^{ab}	2053.1 ^a
DRSM*	14	77.2 ^c	277.1 ^c	614.6 ^d	943.1 ^c	1323.1 ^c	1702.9 ^b
0.1% CuSO ₄ treated DRSM*	14	81.0 ^{bc}	286.5 ^c	641.1 ^c	997.7 ^d	1390.9 ^c	1792.4 ^b
0.2% CuSO ₄ treated DRSM*	14	85.4 ^b	312.4 ^b	681.5 ^b	1098.7 ^c	1549.0 ^b	2024.0 ^a
0.3% CuSO ₄ treated DRSM*	14	95.0 ^a	328.3 ^a	735.7 ^a	1220.5 ^a	1667.1 ^a	2190.5 ^a
N		8	8	8	8	8	8
P Value		0.001	0.001	0.001	0.001	0.001	0.001
SEM		1.335	3.525	8.57	18.138	25.273	38.454

Mean bearing atleast one common superscript in a column do not differ significantly ($P > 0.05$).

DRSM* - Deoiled Rapeseed meal



The higher reduction in body weight gain in birds fed with raw DRSM and 0.1% CuSO₄ treated DRSM incorporated diets may be attributed to the presence of toxic factors such as glucosinolate, progoitrin, tannin and sinapine (Tayaranian and Henkel, 1991). Similar to these findings, (Banday *et al.*, 2003) reported that, chicken fed with 15% treated (CuSO₄ 5H₂O 2g/kg and FeSO₄ 7H₂O 10g/kg) DRSM with or without supplementation of iodine in diet attained more weight either SBM or raw DRSM. However, some workers reported that body weight gain was found to suffer with increasing levels of DRSM in the diet but was significantly depressed at 15% (P<0.01) inclusion level, (Thanaseelaan *et al.*, 2008); (Taraz *et al.*, 2006); (Banday *et al.*, (2003); (Tripathi *et al.*, 1990). Similarly, inclusion of DRSM at 12% level in the diet of broiler chicken depressed weight gain, (Reza Montazersadegh *et al.*, 2003) ; (Vaidya *et al.*, 1979) which was attributed to the presence of toxic factors and glucosinolates left back in the cake after oil extraction which leads to a weight loss. Contrarily, to this rapeseed meal inclusion is tolerable at 14% level (Pokniak *et al.*, 1985).

The feed DRSM treated with copper sulphate has beneficial effect, which forms stable complexes (Pekel *et al.*, 2009) with progoitrin thus limiting the formation of goitrin and also there was reduction in the formation of toxic metabolites namely isothiocyanates and oxyzolidine thiones.

Cumulative Feed Consumption

The cumulative feed consumption varied significantly (P<0.05) among dietary groups during pre starter and starter phases. Dietary inclusion of without or with DRSM (0.1, 0.2 and 0.3%) CuSO₄ treatment DRSM at 14% level in general, resulted in a significant (P<0.05) reduction in feed intake from first to fourth week of age, the trend of which continued till the end of experimental feeding compared with control. However, the feed intake was significantly (P>0.05) not influenced during finisher phase.

Table 2: Effect of dietary inclusion of detoxified Rapeseed meal at graded level on cumulative feed consumption (g) of commercial broiler chicken.

Diets	% in diet	Age in Days					
		0-7	0-14	0-21	0-28	0-35	0-42
Control	0	66.0 ^a	326.9 ^a	947.3 ^a	1588.7 ^a	2443.1	3576.7
DRSM*	14	48.8 ^b	289.9 ^b	818.4 ^b	1493.6 ^{ab}	2382.9	3324.3
0.1% CuSO ₄ treated DRSM*	14	49.5 ^b	291.3 ^b	845.5 ^b	1400.4 ^b	2347.7	3309
0.2% CuSO ₄ treated DRSM*	14	47.3 ^b	287.0 ^b	843.4 ^b	1441.6 ^b	2464.3	3452.5
0.3% CuSO ₄ treated DRSM*	14	49.6 ^b	291.6 ^b	870.8 ^b	1473.2 ^{ab}	2396	3464.3
N		8	8	8	8	8	8
P Value		0.001	0.001	0.003	0.029	0.585	0.1
SEM		1.51	3.02	11.08	19.79	24.39	35.92

Mean bearing atleast one common superscript in a column do not differ significantly (P>0.05)

DRSM* - Deoiled Rapeseed meal

The results are in agreement with reports of (Banday *et al.*, 2003). (Shahidi and Naczki, 1992) reported that inclusion of raw DRSM had lowered feed consumption. This may be due to rapeseed meal contains substantial concentrations of phenolic compounds, which reportedly impart bitter taste and astringency to the diet containing them this results indicate that palatability can be adversely effected by the glucosinolates of DRSM.

Feed Conversion Ratio

The feed efficiency (kg of feed/kg gain) had significant ($P<0.05$) influence among dietary groups with inferior values (1.970 and 1.847) being observed in untreated DRSM or 0.1% CuSO₄ treated DRSM, while 0.2 and 0.3% copper sulphate treated DRSM (1.710 and 1.587) were superior to control (1.746) put in Table 3.

Table 3: Effect of dietary inclusion of detoxified Rapeseed meal at graded level on feed conversion ratio of commercial broiler chicken.

Diets	% in diet	Age in Days					
		0-7	0-14	0-21	0-28	0-35	0-42
Control	0	0.693 ^c	1.055 ^b	1.299 ^{ab}	1.364 ^b	1.539 ^{ab}	1.746 ^b
DRSM*	14	0.636 ^{bc}	1.047 ^b	1.334 ^b	1.586 ^c	1.764 ^c	1.970 ^c
0.1% CuSO ₄ treated DRSM*	14	0.613 ^{bc}	1.018 ^b	1.322 ^b	1.409 ^b	1.692 ^{bc}	1.847 ^c
0.2% CuSO ₄ treated DRSM*	14	0.552 ^{ab}	0.918 ^a	1.237 ^{ab}	1.312 ^{ab}	1.626 ^{bc}	1.710 ^{ab}
0.3% CuSO ₄ treated DRSM*	14	0.531 ^a	0.888 ^a	1.187 ^a	1.231 ^a	1.447 ^a	1.587 ^a
N		8	8	8	8	8	8
P Value		0.002	0.001	0.069	0.001	0.003	0.001
SEM		0.153	0.13	0.191	0.265	0.297	0.301

Mean bearing atleast one common superscript in a column do not differ significantly ($P>0.05$)
DRSM* - Deoiled Rapeseed meal

Present study results showed that birds fed on raw DRSM and 0.1% CuSO₄ treated DRSM had significantly ($P<0.05$) poor feed conversion ratio, this may be due to the presence of toxic factors like glucosinolates and other antinutritional factors. Similar findings were reported by (Griffiths *et al.*, 1980), (Jamroz 1995), (Banday *et al.*, 2003); (Taraz *et al.*, 2006) and (Thanaseelaan *et al.*, 2008) where as those birds fed 0.3% CuSO₄ treated DRSM had better FCR than control. Similar findings were reported by (Banday *et al.*, 2003), (Schone *et al.*, 2003). This may be due to copper sulphate detoxified glucosinolates other antinutritional factors in the DRSM.

Economics

Economics of feeding of DRSM based diets indicated that 0.2 and 0.3% copper sulphate treated DRSM increased returns over feed cost than that of untreated DRSM or 0.1% CuSO₄ treated DRSM and control diets (Table 4).

Table 4: Influence of different diets on the cost of feeding, returns over feed cost and profit / loss over control diet at market age (42 days)

Treatment	% in diet	Cumulative feeding cost / bird (Rs)	Body wt. At 6 wks (g)	Sale amount* (Rs / bird)	Returns over feed cost (Rs / bird)	Profit / loss over control (Rs / bird)
Control	0	107.459	2096.4	176.09	68.639	-
DRSM*	14	95.563	1746.82	146.73	51.17	-17.469
0.1% CuSO ₄ treated DRSM*	14	95.09	1835.07	154.14	59.056	-9.583
0.2% CuSO ₄ treated DRSM*	14	99.249	2066.89	173.61	74.37	5.731
0.3% CuSO ₄ treated DRSM*	14	99.65	2234.59	187.7	88.056	19.417

Similar findings were reported by (Banday *et al.*, 2003; Thanaseelaan *et al.*, 2008). (Ashnie *et al.*, 2015) reported decreased net income at higher level of DRSM inclusion, regardless of its cheaper cost as compared to other ingredients is due to the adverse effects of DRSM on feed intake, growth rate and feed conversion efficiency that resulted in lower bodyweight. (Naseem *et al.*, 2006) reported decreased average diet cost with increasing dietary canola meal.

Conclusion

It has been concluded that replacing soyabean meal in chicken feed with 0.3% copper sulphate treated 14% DRSM gave better performance and increased returns over feed cost compare to other treatment groups in the broiler chickens. Hence, 0.3% copper sulphate treated DRSM at 14% level could be safely incorporated in broiler chicken diet.

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