EFFECT OF FEEDING RAPESEED MEAL IN MEAT TYPE CHICKEN*

V. Thanaseelaan[1], K.Viswanathan[2], K.Venukopalan[3], R. Prabakaran[4] and M. Chellapandian[5]
Veterinary University Training and Research Centre
Ramayanpatti, Tirunelveli – 627 358.

Feed constitutes nearly 70 per cent of total production cost in poultry. Of the many plant protein sources, de oiled groundnut cake (GNC) is the one most commonly used poultry feed ingredient in India. GNC, though high in protein, is a poor source of methionine and lysine and invariably contains aflatoxins which are potent carcinogens and toxic to poultry. A suitable alternative to GNC could be de oiled rapeseed meal (RSM) which was found to be rich in crude protein (34.92%) and a fairly good source of lysine (2.12%) and methionine (0.70%). RSM was also found to be a good source of calcium, phosphorus, magnesium, manganese, zinc, copper and iron (Thanaseelaan *et al.,* 2007). However, the use of RSM is limited by the presence of anti nutritional factors like glucosinolates, sinapine, tannins, erucuc acid and phytate. Hence in order to find out the effect of feeding de oiled rapeseed meal at varying levels replacing de oiled groundnut cake on the performance of meat type chicken, the following study was conducted.

A biological trial was conducted with 0, 5, 7.5, 10, 12.5 and 15 per cent levels of raw RSM replacing GNC in White Plymouth Rock (IR_2) meat type chicken to study the effect on performance from 0 – 8 weeks of age. A total of 306 day old straight-run chicks were distributed randomly to the six treatments with three replicates of seventeen chicks each. All the chicks were fed *ad libitum* with starter (0 – 4 weeks) and finisher (5 – 8 weeks) rations made *isocaloric* and *isonitrogenous* by making appropriate changes in inclusion levels of other ingredients. The per cent ingredient composition and calculated chemical composition of the starter and finisher rations are given in Table 1. The body weight of individual birds and feed consumption of each replicate group were recorded bi-weekly up to 8 weeks of age. Feed intake, feed efficiency for 0 – 4 weeks, 5 – 8 weeks, 0 – 8 weeks and the feed cost per kg body weight gain were calculated. Mortality among the experimental birds during the study period was recorded and their causes were ascertained by conducting detailed necropsy. Data on various carcass traits from representative samples were collected after slaughtering birds at 8 weeks of age. The statistical analysis of the data was done as per the methods of Snedecor and Cochran (1989).

The growth rate in terms of body weight gain was found to suffer with increasing levels of RSM in the diet (Table 2) but was significantly ($P < 0.01$) depressed only at 15% inclusion level (T6). These results matched with Tripathi *et al.* (1990) that mustard cake could be safely included at 10% level replacing groundnut cake in broiler rations and beyond 10% level the body weight gains were significantly lowered. Contrarily, Griffiths *et al.* (1980)

* Part of Ph.D., thesis of the first author submitted to Tamil Nadu Veterinary and Animal Sciences University, Chennai – 51. email ID of corresponding author: vthanaseelan@yahoo.co.in

[1] Associate Professor, VUTRC, Ramayanpatti, Tirunelveli.
[2] Dean, Veterinary College and Research Institute, Namakkal.
[3] Professor, Department of Poultry Science, Madras Veterinary College, Chennai.
[4] Director, Centre for Animal Production Studies, TANUVAS, Chennai.
[5] Associate Professor and Head, VUTRC, Rajapalayam.

observed reduction in body weight by about 7 – 11% up on feeding high glucosinolate *Brassica napus* meal at 10% level itself. The contrasting results might possibly be due to the level of glucosinolates in the RSM. Though marginal differences could be observed in the mean cumulative feed intake of the birds in different groups (Table 2), the values did not differ significantly both during early and later ages. The lower intake in T6 group at 15% level during 0 – 4 weeks was found to be compensated during 5 – 8 weeks. These results agree with those of Javed *et al.* (1999) that feed consumption was not influenced even at 15% RSM inclusion in broiler diets. The fact that all the experimental diets were made *isocaloric* might have ensured that there was no significant difference in feed intake between treatments. As stated by Yapar and Cladinin (1972), tannins in RSM might have caused a marginal reduction in metabolizable energy values of the rations leading to marginally higher feed intake with increasing levels of RSM in the ration. Though not statistically significant, there were definite numerical differences in feed efficiency (Table 2) and the relationship appeared negatively linear indicating poorer feed utilisation with higher levels of RSM. Poor body weight gain of birds might have contributed to poorer feed efficiency in this experiment as feed intake was not greatly influenced by RSM. The presence of toxic factors in RSM like glucosinolates, tannins etc. (Bell, 1993 and Jamroz, 1995) might have ensured poor feed utilisation in meat type chicken. There was a linear increase in feed cost per kg gain with increasing levels of RSM as a result of poor feed efficiency. Addition of RSM in diets did not have any cost advantage over the control diet. The mean feed cost was the highest for T6 group with 15% RSM inclusion.

All the treatment groups had shown excellently high mean livability percentage ranging between 98.04 and 100%. Though visible toxic effects like damage to liver and kidneys were absent, leg abnormalities in the form of enlarged hock were observed at 7 weeks of age in T6 group (15% RSM). Seth and Cladinin (1973) attributed the incidence of leg abnormalities to high tannin levels in RSM. Among the carcass traits (Table 3), the New York dressed weight (%) was found to be higher at higher levels of RSM (15%) indicating that loss due to blood and feathers became increasingly lesser up on inclusion of RSM. Similarly giblet weight (%) was also significantly higher at 15% RSM inclusion. Mean breast angle values, weights of kidney, spleen and thyroid were not found to be influenced by RSM in this experiment. Javed *et al*. (1990) also could not observe any difference in weights of spleen and kidney indicating RSM did not cause any pathogenic impairment of haemopoietic system or toxicity. Though several authors (Mawson *et al*., 1995; Banday *et al*., 2000) had reported increase in thyroid weights up on feeding RSM in broilers, no apparent weight changes of thyroid was recorded in this study. The fact that purebred meat type chicken with low growth potential was involved in this experiment might have been the reason for the failure to observe apparent changes in the weight of thyroid.

Based on the results of this study, it is concluded that raw rapeseed meal (RSM) when included in the ration of meat type chicken replacing GNC at 5, 7.5, 10, 12.5 and 15% levels depressed the body weight gain and increased the feed intake thereby reducing the feed efficiency with a linear dose related increase in feed cost per kg gain. Inclusion of raw RSM at 15% level also resulted in leg abnormalities.

Table 1

Per cent ingredient and chemical composition of starter, finisher rations

Ingredient composition (%)	Starter ration						Finisher ration					
	T1	T2	T3	T4	T5	T6	T1	T2	T3	T4	T5	T6
Maize	**35**	**34**	**35**	**36**	**37**	**38**	**56**	**57**	**58**	**59**	**60**	**62**
Cumbu (Pearl millet)	**14**	**14**	**12**	**10**	**8**	**6**	**10**	**7**	**5**	**3**	**0**	**0**
Rice Polish	**11**	**11**	**11**	**11**	**11**	**11**	**5**	**5**	**5**	**5**	**6**	**2.5**
SBOC – Soybean meal	**16**	**17**	**18**	**19**	**20**	**21**	**6**	**8**	**9**	**10**	**11**	**12.5**
GNC	**15**	**10**	**7.5**	**5**	**2.5**	**0**	**15**	**10**	**7.5**	**5**	**2.5**	**0**
RSM	0	5	7.5	10	12.5	15	0	5	7.5	10	12.5	15
Dry fish	**6**	**6**	**6**	**6**	**6**	**6**	**5**	**5**	**5**	**5**	**5**	**5**
Min. & Vitamin mixture[1]	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Coccidiostat[2]	+	+	+	+	+	+	+	+	+	+	+	+
Chemical Composition (%) – calculated values												
Crude protein	**23.33**	**23.13**	**23.13**	**23.13**	**23.13**	**23.03**	**18.90**	**18.94**	**18.94**	**18.94**	**18.97**	**18.98**
Lysine	**1.17**	**1.21**	**1.23**	**1.26**	**1.29**	**1.32**	**0.89**	**0.89**	**0.92**	**0.95**	**0.97**	**1.01**
Methionine	**0.38**	**0.40**	**0.41**	**0.42**	**0.43**	**0.44**	**0.32**	**0.34**	**0.35**	**0.36**	**0.37**	**0.39**
Calcium	**1.36**	**1.43**	**1.43**	**1.45**	**1.47**	**1.50**	**1.23**	**1.30**	**1.33**	**1.35**	**1.38**	**1.40**
Available Phosphorus	**0.42**	**0.45**	**0.47**	**0.49**	**0.50**	**0.52**	**0.39**	**0.42**	**0.44**	**0.45**	**0.47**	**0.48**
ME (kcal/kg)	**2775**	**2758**	**2776**	**2762**	**2764**	**2766**	**2893**	**2888**	**2890**	**2890**	**2885**	**2889**

1. Supplied by M/S Sarabhai Chemicals, Vadodara. Each 250 g contains 75g calcium, 2.75g manganese, 0.1g iodine, 0.75g iron, 1.5g zinc, 0.2g copper, 0.45g cobalt, 5 lacs I.U. vitA, 1 lac I.U. vitD_3, 0.2g vitB_2, 75 I.U. vitE, 0.1g vitK, 0.25g calcium pantothenate, 1g nicotinamide, 0.6 mg vitB_{12} and 15g choline chloride.

2. Supplied by M/S Vetcare P.Ltd., Bangalore. Contains 3,5-dinitro-ortho-toluamide 25% w/w mixed @ 50g/100kg.

Common salt was not added to the diet as salted dry fish was incorporated in the ration

Table 2

Body weight gain, feed intake, feed efficiency and feed cost/kg gain of meat type chicken fed different levels of RSM

Parameter	Age	Treatment (Inclusion level of RSM)					
		T1 (0%)	T2 (5%)	T3 (7.5%)	T4 (10%)	T5 (12.5%)	T6 (15%)
Body weight gain (g)	**0-4 weeks**	**357 ^{A} ± 6.71**	**355 ^{A} ± 6.03**	**344 ^{A} ± 8.70**	**349 ^{A} ± 7.91**	**338 ^{A} ± 7.71**	**313 ^{B} ± 9.26**
	5-8 weeks	**787 ^{A} ± 19.59**	**795 ^{A} ± 14.96**	**766 ^{A} ± 16.70**	**750 ^{A} ± 9.86**	**753 ^{A} ± 11.29**	**721 ^{B} ± 14.55**
	0-8 weeks	**1144 ^{A} ± 26.27**	**1150 ^{A} ± 22.06**	**1110 ^{A} ± 21.59**	**1099 ^{A} ± 14.83**	**1091 ^{A} ± 13.89**	**1034 ^{B} ± 21.73**
Feed intake (g)	**0-4 weeks**	**725 ± 20.14**	**755 ± 16.55**	**722 ± 23.68**	**774 ± 15.90**	**777 ± 14.98**	**741 ± 20.32**
	5-8 weeks	**2227 ± 29.31**	**2234 ± 35.91**	**2296 ± 40.26**	**2258 ± 43.91**	**2266 ± 35.64**	**2322 ± 52.91**
	0-8 weeks	**2952 ± 40.33**	**2989 ± 44.19**	**3018 ± 56.97**	**3032 ± 54.79**	**3043 ± 46.87**	**3063 ± 62.68**
Feed efficiency	**0-4 weeks**	**2.03 ± 0.08**	**2.13 ± 0.04**	**2.10 ± 0.06**	**2.22 ± 0.04**	**2.30 ± 0.13**	**2.37 ± 0.06**
	5-8 weeks	**2.83 ± 0.23**	**2.81 ± 0.05**	**2.99 ± 0.06**	**3.01 ± 0.08**	**3.01 ± 0.06**	**3.22 ± 0.08**
	0-8 weeks	**2.58 ± 0.16**	**2.60 ± 0.09**	**2.72 ± 0.05**	**2.76 ± 0.04**	**2.79 ± 0.05**	**2.96 ± 0.06**
Feed cost (Rs.) per kg body weight gain	**0-4 weeks**	**17.76**	**18.29**	**17.91**	**18.83**	**19.37**	**19.81**
	5-8 weeks	**23.66**	**23.15**	**24.49**	**24.47**	**24.29**	**25.95**
	0-8 weeks	**21.82**	**22.00**	**21.53**	**22.68**	**22.77**	**24.09**

$^{a, b}$ Means within a row with no common superscripts differ significantly at $P < 0.01$.

Table 3

Carcass traits, breast angle and organ weights of meat type chicken fed different levels of RSM

Parameter	Treatment (Inclusion level of RSM)					
	T1 (0%)	T2 (5%)	T3 (7.5%)	T4 (10%)	T5 (12.5%)	T6 (15%)
Pre-slaughter weight (g)	**$1262^{A} \pm 40.88$**	**$1162^{A} \pm 53.95$**	**$1159^{A} \pm 36.60$**	**$1124^{A} \pm 47.46$**	**$1120^{A} \pm 36.77$**	**$1064^{B} \pm 37.44$**
New York Dressed weight (%)	**$88.81^{D} \pm 0.48$**	**$89.47^{CD} \pm 0.47$**	**$89.94^{BCD} \pm 0.23$**	**$90.66^{ABC} \pm 0.30$**	**$90.93^{AB} \pm 0.31$**	**$91.30^{A} \pm 0.33$**
Ready to cook weight (%)	**70.12 ± 0.79**	**70.17 ± 0.61**	**69.86 ± 0.74**	**67.03 ± 3.92**	**69.34 ± 0.79**	**71.34 ± 0.59**
Eviscerated weight (%)	**64.87 ± 0.78**	**64.49 ± 0.61**	**63.64 ± 0.58**	**65.16 ± 0.44**	**64.03 ± 0.76**	**65.18 ± 0.60**
Giblet weight (%)	**$7.28^{B} \pm 0.15$**	**$7.69^{AB} \pm 0.26$**	**$7.90^{AB} \pm 0.29$**	**$7.69^{AB} \pm 0.30$**	**$7.33^{B} \pm 0.15$**	**$8.63^{A} \pm 0.37$**
Breast angle (°)	**68.83 ± 1.42**	**69.75 ± 1.12**	**67.67 ± 1.08**	**69.17 ± 2.13**	**69.58 ± 1.90**	**66.08 ± 1.70**
Kidney weight (g)	**6.56 ± 0.41**	**5.89 ± 0.55**	**5.91 ± 0.92**	**5.97 ± 0.48**	**5.97 ± 0.38**	**5.63 ± 0.45**
Spleen weight (g)	**2.15 ± 0.18**	**2.35 ± 0.23**	**2.45 ± 0.19**	**2.65 ± 0.22**	**2.55 ± 0.30**	**2.25 ± 0.25**
Thyroid weight (g)	**0.079 ± 0.004**	**0.067 ± 0.006**	**0.073 ± 0.005**	**0.079 ± 0.006**	**0.068 ± 0.007**	**0.073 ± 0.006**

A, B, C, D Means within a row with no common superscripts differ significantly at $P < 0.01$