

EFFECT OF DIETARY SUPPLEMENTATION OF PREBIOTIC, ANTIBIOTIC AND HERBAL COMPOUNDS ON GROWTH, FEED INTAKE AND FCR IN NEW ZEALAND WHITE RABBITS

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ABSTRACT

The present study was conducted on one month age twenty four weaned broiler rabbits having similar body weights, which were divided into four groups with 6 rabbits in each group for a period of 42 days to study the effect of inclusion of Mannan oligosaccharides (MOS), Oxytetracycline and *Ocimum sanctum* supplements in the basal diet on growth performance, feed intake and FCR in New Zealand white rabbits. The study revealed that initial and final body weights, daily and weekly feed intakes and FCR did not differ significantly. However, higher body weights and lower FCR values were recorded in treatment groups supplemented with MOS and Tulasi (*Ocimum sanctum*).

Key words: Growth, MOS, Oxytetracycline, *Ocimum sanctum*, Rabbits.

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INTRODUCTION

Rabbits (*Oryctolagus cuniculus*) are widely known for their short gestation period, highest prolificacy, greater use of low grain and fibre-rich feed stuffs, efficient feed conversion ratio, remarkable growth rate with minimal space requirements and inexpensive

capital expenditure. Because of their physical characteristics, including their body shape, white fur, attractive and appealing the New Zealand white breed of rabbits is kept as a domestic animal. Broiler rabbits develop quickly, which places a lot of stress on them and causes poor performance and a high mortality. In addition, stress also caused by environmental, nutritional and/or pathological factors (Aikipitanyi and Egweh, 2020). Apart from these stressors, oxidative stress is a major concern during the period of rapid growth in broiler rabbits. Reactive oxygen species (ROS) induced oxidative stress is a major contributor to a variety of diseases, weight loss and

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mortality (Liu *et al.*, 2018). One of the typical strategies for lowering stress among the several processes is adding various anti-stressors to the diet. Prebiotics, antibiotics that promote growth, and phytogetic/herbal substances are frequently used as dietary supplements to fight oxidative stress (Varaprasad Reddy *et al.*, 2009).

Mannan oligosaccharides are a group of prebiotics, which protects the intestinal mucosal receptors by washing out the harmful pathogens resulting in optimum growth and weight gain of the animals (Ayyat *et al.*, 2018; Abdel-Hamid and Farahat, 2015). It has long been believed that adding antibiotics like tetracycline to animal feed will promote growth (Soler *et al.*, 2016). Phytogetic feed additives are defined as herbal ingredients added to feed to improve animal's performance, health and production. They serve to improve the flavour, taste and feed utilization and there by animal performance (Krieg *et al.*, 2009; Karaskova *et al.*, 2015). Tulasi (*Ocimum sanctum*) is one of the herbal ingredients added to the diets for better growth by reducing the oxidative stress in broiler chicken (Varaprasad Reddy *et al.*, 2014).

Therefore, a study was undertaken to observe the effect of Mannan oligosaccharides, Oxytetracycline and *Ocimum sanctum* supplementation on growth, feed intake and FCR in New Zealand white rabbits.

MATERIALS AND METHODS

The present research work was carried out at College of Veterinary Science,

Tirupati and all the experimental procedures were reviewed and approved by the institutional animal ethics committee (281/go/ReBi/S/2000/CPCSEA/CVSc/TPTY/015/Physiology/2021/dated 24.08.2021).

Prebiotic (Mannan oligosaccharides; MOS) used in this experiment was procured in the form of powder from Jilariya chemphar company, Gujarat. An antibiotic oxytetracycline hydrochloride powder was procured from Medibios laboratories Ltd., Thane. Tulasi (*Ocimum sanctum*) leaves were collected freshly from the local gardens, thoroughly washed, shade dried and made it into powder. The basal ration used for the experiment was procured from VRK Nutritional Solutions, Maharashtra.

The experiment was conducted in twenty four New Zealand white male rabbits weighing around 580 g that were assigned into four homogeneous treatment groups randomly (C1, T1, T2 and T3) each with six rabbits. C1 group supplemented with basal diet only, whereas T1 group with basal diet + Mannan oligosaccharide @ 1.0 g/ Kg feed, T2 group with basal diet + oxytetracycline hydrochloride powder @ 250mg/ Kg feed and T3 group supplemented with basal diet + *Ocimum sanctum* leaf powder @ 50 g/ Kg feed. The basal ration mixed with the prebiotic (MOS), antibiotic (oxytetracycline) and herbal preparation (*Ocimum sanctum*) separately as per the dose. The trial was conducted for a period of 42 days (6 weeks).

Experimental rabbits were weighed before the start of the experiment and

subsequently every week (1st to 6th week) till the end of the experimental period, average daily feed intake of rabbits was determined by taking difference between feed offered and feed left over every day.

Feed conversion ratio (FCR)

FCR is calculated by using following formula (Sireesha *et al.*, 2017).

$$\text{FCR} = \frac{\text{Feed consumed (kg)}}{\text{Gain in body weight (kg)}}$$

The results obtained were subjected to analysis through software (version 22.0, SPSS 2013) by applying one way analysis of variance through generalized linear model and the treatment means were ranked using Duncan's multiple range test with a significance at $P < 0.05$ (Duncan, 1955). All the statistical procedures were done as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The initial and weekly (1 to 6 week) body weights of rabbits in all the treatment groups are presented in Table I. There was no significant difference ($P > 0.05$) with respect to initial body weights among the different groups indicated the homogeneity of the experimental animals.

The final body weights (6th week) of C1, T1, T2 and T3 groups did not show significant ($P > 0.05$) difference. However, the final body weights were higher in T1 (1751.5±23.63), T2 (1709.33±40.63) and T3 (1760.5±33.66) groups compared to the C1 group (1670.33±27.30).

These results are in agreement with Attia *et al.* (2013) and Mourao *et al.* (2006) who reported a non-significant increase in the final body weight of the rabbits when feeding with MOS. In spite of absence of significance, an increase in final body weights in the present study with MOS supplementation may be due to the prebiotics which encourage the development and/or activity of gastrointestinal microbiota selectively (Gibson and Roberfroid, 1995) bestowing benefits up on host well-being and health (Gibson *et al.*, 2004). Oso *et al.* (2013) reported a significantly ($P < 0.05$) higher body weights in growing rabbits with dietary supplementation of probiotics and prebiotics. This discrepancy may be due to difference in the experimental time period, since, they supplemented MOS and oxytetracyclin to the rabbits for 70 days whereas, in our study the supplementation is only for 42 days.

The final body weights attained with the supplementation of oxytetracycline in the present study exhibited a non-significant increase. These findings are in contrary with the reports of Abdel-Samad *et al.* (2021), who reported lower final body weights in oxytetracycline supplemented group in weaned growing rabbits, this may be due to the higher dietary levels of oxytetracycline (200 mg/kg body weight), which causes hepatic damage and resulting in mal-absorption of end products of digestion leading to lower weight gains. Whereas, Oso *et al.* (2013) reported a significantly ($P < 0.05$) higher body weights with dietary inclusion of oxytetracycline (1g/Kg feed) in growing rabbits, since oxytetracycline act as growth

promoter. Dietary supplementation of *Ocimum sanctum* in the present study exhibited a non-significant increase in the final body weights. Varaprasad Reddy *et al.* (2014) also reported similar results in broiler chicken. Whereas, a significant increase in the body weights were reported by Buba *et al.* (2016) with dietary inclusion of *Ocimum sanctum* @ 4 g/Kg feed supplemented for 8 weeks in growing rabbits. Swathi *et al.* (2012) reported a significantly ($P < 0.05$) higher final bodyweight with supplementation of 0.25% and 0.5% of *Ocimum sanctum* in heat stressed broiler chicken. The higher body weights found in the present study may be due to inclusion of *Ocimum sanctum* leaf powder in diet, which improved taste and flavour thereby improved digestion, intestinal health and allowing efficient utilization and absorption of nutrients (Krieg *et al.*, 2009; Karaskova *et al.*, 2015).

The average daily feed intake (g/day) did not show significant ($P > 0.05$) difference among treatment and control groups (Table II). Similarly, average weekly feed intake (g/day) of the rabbits during experimental period in different groups did not show significant ($P > 0.05$) difference (Table.III).

These observations were in close agreement with the reports made by Attia *et al.* (2013) and Oso *et al.* (2013) with supplementation of MOS in growing rabbits. However, the results in the present study are in contrast with findings of Bovera *et al.* (2012) who reported a significant increase in the average daily feed intake in fattening rabbits with dietary supplementation of MOS.

The decrease in the feed intake as reported by Attia *et al.* (2014) may be due to the supplementation of MOS at higher doses (35 mg/Kg body weight) in growing rabbits. The results obtained in the present study were in close agreement with the reports made by Oso *et al.* (2013) with supplementation of oxytetracycline in growing rabbits. Whereas, Buba *et al.* (2016) reported a significant increase in the total feed intake with supplementation of Tulasi in growing rabbits.

The average feed conversion ratio (FCR) of the rabbits during the experimental period in different groups are depicted in Fig 1. The feed conversion efficiency improved in treatment groups over control group but it was statistically not significant ($P > 0.05$). The FCR in the present study did not show significant ($P > 0.05$) difference in all treatment groups (Fig 1). Whereas, Oso *et al.* (2013) reported a significant decrease in the FCR with dietary supplementation of MOS in growing rabbits. This discrepancy may be due to variation in the experimental period. The results obtained in the present study are in close agreement with that of Attia *et al.* (2013) and Attia *et al.* (2014) who also reported no significant difference in FCR with supplementation of MOS in growing rabbits. Oso *et al.* (2013), who also reported a significant decrease in FCR by supplementation of oxytetracycline (1gm/Kg feed) in growing rabbits. The lower FCR values exemplifies the growth promoting nature of oxytetracycline (Khadem *et al.*, 2014). Low FCR values recorded with supplementation of tulasi leaf powder in the present study may be due to attainment of better

Table I: Mean weekly body weights (g) of experimental rabbits

	C1	T1	T2	T3
Initial bodyweight	571.16±16.30 ^a	578.5±14.47 ^a	582.83±14.56 ^a	587.16±13.76 ^a
1 st week	781.3±14.85 ^a	787.83±20.38 ^a	777.16±32.70 ^a	797.16±19.80 ^a
2 nd week	965.5±15.93 ^a	984.83±14.63 ^a	967.83±25.48 ^a	982.66±24.50 ^a
3 rd week	1137.16±29.36 ^a	1173.5±23.43 ^a	1152.66±38.54 ^a	1172.5±28.95 ^a
4 th week	1311.66±26.85 ^a	1366.16±36.26 ^a	1335.83±35.41 ^a	1368.66±39.96 ^a
5 th week	1484.5±20.59 ^a	1553.83±22.35 ^a	1524.16±35.36 ^a	1561.33±26.21 ^a
6 th week	1670.33±27.30 ^a	1751.5±23.63 ^a	1709.33±40.63 ^a	1760.5±33.66 ^a

Means with same superscripts in each row do not differ significantly (P>0.05)

Table II: Mean daily feed intake (g) of experimental rabbits

	C1	T1	T2	T3
1 st week	64.23±1.42 ^a	65.37±2.88 ^a	61.66±2.54 ^a	63.53±4.35 ^a
2 nd week	82.65±3.27 ^a	84.61±3.17 ^a	83.53±3.30 ^a	80.21±4.64 ^a
3 rd week	83.66±2.35 ^a	87.41±2.34 ^a	85.51±5.17 ^a	84.91±4.53 ^a
4 th week	84.81±2.88 ^a	89.54±3.44 ^a	86.58±3.99 ^a	88.15±3.87 ^a
5 th week	85.16±2.20 ^a	87.77±3.91 ^a	89.65±2.48 ^a	89.95±3.91 ^a
6 th week	87.78±1.94 ^a	91.51±4.01 ^a	84.73±4.73 ^a	93.25±4.01 ^a
Mean±SE	81.27±3.48 ^a	81.84±4.31 ^a	83.09±4.35 ^a	84.13±3.91 ^a

Means with same superscripts in each row do not differ significantly (P>0.05)

Table III: Mean weekly feed intake (g) of experimental rabbits

	C1	T1	T2	T3
1 st week	449.63±9.97 ^a	457.59±20.22 ^a	431.63±17.81 ^a	444.74±30.47 ^a
2 nd week	578.55±22.98 ^a	592.31±22.21 ^a	584.73±23.11 ^a	561.51±32.48 ^a
3 rd week	585.66±16.46 ^a	611.91±16.40 ^a	598.61±36.20 ^a	594.42±31.72 ^a
4 th week	593.71±20.19 ^a	626.78±11.94 ^a	606.08±27.93 ^a	617.05±24.12 ^a
5 th week	596.16±15.41 ^a	614.39±27.37 ^a	627.55±17.36 ^a	629.68±29.00 ^a
6 th week	614.48±13.59 ^a	640.59±28.09 ^a	593.13±33.15 ^a	652.79±30.73 ^a
Mean±SE	569.70±24.51 ^a	590.59±27.40 ^a	573.62±29.01 ^a	583.37±30.50 ^a

Means with same superscripts in each row do not differ significantly (P>0.05)

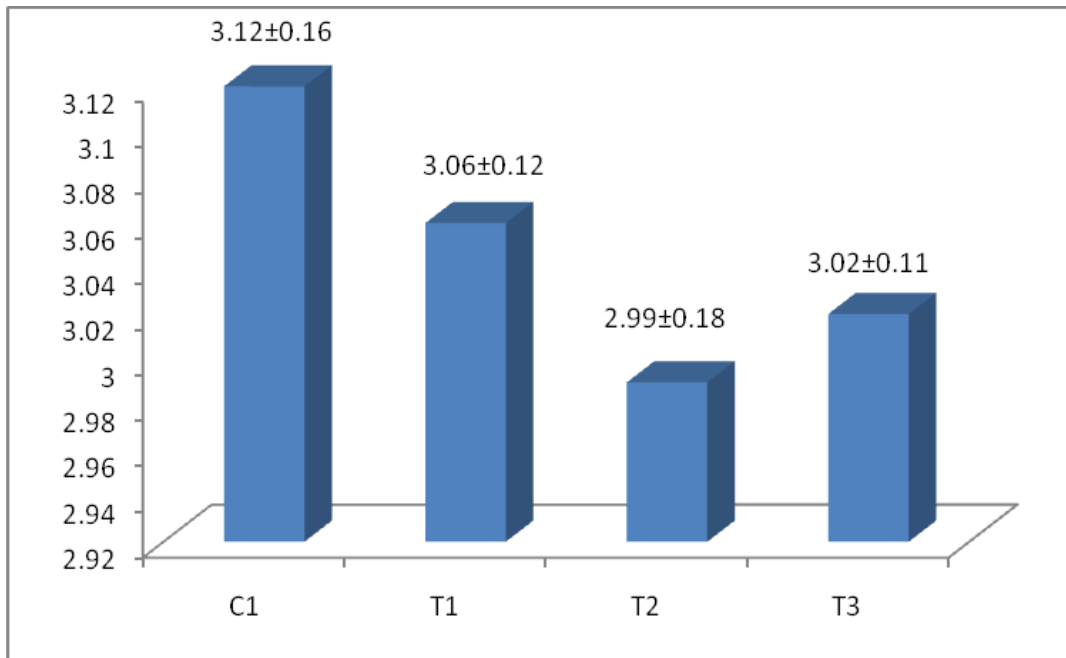


Figure 1: Mean feed conversion ratio of experimental rabbits

body weights and growth promoting nature of tulasi as phytogetic feed additive. The results obtained in the present study were in close agreement with the findings of Varaprasad Reddy *et al.* (2014) in broiler chicken. Buba *et al.* (2016) reported a significant decrease in FCR, with inclusion of tulasi (4 g/ Kg feed) in growing rabbits.

CONCLUSION

The present study revealed the effect of dietary supplementation of MOS, oxytetracycline and *Ocimum sanctum* on growth, feed intake and FCR in New Zealand white rabbits. The final body weights and feed intake in all the groups did not show significant ($P>0.05$) difference. But prebiotic,

antibiotic and herbal supplemented groups exhibited a non-significant positive growth and feed intake compared to the control group. The feed conversion efficiency was improved in treatment groups over control group, but FCR in all the groups did not show significant ($P>0.05$) difference.

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