

EFFECT OF MANNAN OLIGOSACCHARIDES ON GROWTH PERFORMANCE AND FEED EFFICIENCY IN BROILER RABBIT

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ABSTRACT

A feeding trial for a period of four months was conducted using eighteen weaned White Giant broiler rabbits, belonging to University Rabbit Farm, Mannuthy with three groups of six replicates each, to assess the effect of supplementation of Mannan oligosaccharide (MOS) on growth performance and feed efficiency. The animals were divided into three groups of six animals as uniformly as possible with regard to sex, age and weight and were randomly allotted to three dietary treatments. The animals were fed with three experimental rations, T1- control ration (16 per cent CP and 2500 kcal/ kg DE), T2- control ration + 1.5 g MOS/ kg diet and T3- control ration + 3 g MOS/ kg diet. Individual body weight at fortnightly interval and daily dry matter intake were recorded and average daily gain and feed conversion efficiency were calculated. The results of the study indicated that the addition of MOS at both levels resulted in similar performance as that of the control group without any additive.

Keywords: Prebiotic, mannan oligo-saccharide, broiler rabbit

INTRODUCTION

Growing rabbits are highly prone to digestive disorders and weaning is one of the major critical stage for rabbit production. The digestive disorders are characterized by loss of appetite, diarrhoea, reduced growth rate and mortality. The use of prophylactic growth promoters at weaning time is advantageous. The addition of antibiotic growth promoter (AGP) at sub therapeutic concentration can suppress bacterial fermentation which results in increased nutrient availability and better growth performance (Corpet, 1999; Skrivanova *et al.*, 1999). But because of development of antibiotic resistance and presence of antibiotic residue in meat the European Union has banned the use of AGP in animal feeds.

The increased demand of safe whole some food from consumers necessitates the use of alternative growth promoters in animal feeds. Addition of prebiotics is one of the safe alternative approach. Oligosaccharides as prebiotics are a class of carbohydrates that are not digested or absorbed in small intestine of animals, but can readily ferment intestinal content. Thus it increases the number of beneficial micro-organisms and also suppresses harmful

pathogens (Quigley, 2004). Bio-Mos is a phosphorylated mannan oligosaccharide, derived from the outer cell wall of yeast *Saccharomyces cerevisiae* and contain a mannan component which resembles that of carbohydrate on animal gut wall. This serves as an alternative attachment for entero-pathogens and can successfully eliminate pathogenic microbes. The aim of the present study was to evaluate the effect of dietary supplementation of MOS on growth performance and feed intake in broiler rabbits.

MATERIALS AND METHODS

Experimental Animals

Eighteen weaned White Giant broiler rabbits of four to six weeks age, selected from University Rabbit farm, Mannuthy formed the experimental subjects for the study. All the animals were housed individually and maintained under uniform conditions prevailing in the farm. The rabbits were divided into three groups of six animals each and randomly allotted to one of the three dietary treatments (T₁, T₂ and T₃), using completely randomised design.

Housing and management

The experimental animals were housed individually in metallic cages with facilities for feeding and watering. Weighed quantities of respective feed and fodder were offered daily to each rabbit. The left over portion of the feed and green grass were weighed daily and their moisture content was analyzed to calculate the dry matter intake. Body weight of all the animals was recorded fortnightly. All rabbits were provided with feed and fresh water *ad libitum*. The animals were

maintained on their respective feeding regime for a period of four months.

Experimental diets

The rabbits in the three experimental groups were fed with a diet containing 16 per cent crude protein and 2500 kcal DE/kg diet for the entire feeding period of 4 months. The three experimental rations were, T₁ - basal diet (control diet, NRC 2007), T₂ - control diet + 1.5 g MOS/ kg diet and T₃ - control diet + 3 g MOS/ kg diet. Concentrate feed was offered in the morning and roughage in the evening. Green grass was offered as the sole roughage. Fresh water was provided to all animals *ad libitum*. Per cent ingredient composition of rations are furnished in Table 1.

Growth pattern and efficiency

Daily feed intake and fortnightly body weight of individual animals in each group were recorded during the entire period of experiment and the observations were used to arrive at daily dry matter intake (g), average daily gain (ADG) and feed conversion efficiency (FCE).

Statistical analysis

Data obtained on different parameters during the course of the experiment were subjected to statistical analysis using analysis of variance (ANOVA) (Snedecor and Cochran, 1994) using S.P.S.S. version 20.

RESULTS AND DISCUSSION

Body weight and weight gain

The fortnightly average body weight of rabbits maintained on three dietary treatments is documented in Table 2. The

average initial body weight of rabbits maintained on three dietary treatments T1, T2 and T3 was 0.43, 0.55 and 0.51 kg, respectively. The average final body weight recorded at the end of feeding trial was 2.01, 2.10 and 2.04 kg, respectively. The corresponding average total body weight gain was 1.58, 1.56 and 1.53 kg respectively (Table 3). The results revealed that no significant difference existed among the dietary treatments with regard to body weight gain.

The results obtained in the present study shows that the supplementation of MOS at 1.5 g and 3g per kg diet did not improve the body weight and body weight gain. This finding is in agreement with the reports of Fonseca *et al.* (2004), Volek *et al.* (2007) and Pinheiro *et al.* (2005) who noted that the inclusion of MOS in diet of rabbit had no significant effect on the live weight and weight gain.

On contrary, Ewuola *et al.* (2011) and Oso *et al.* (2013) reported that mannan oligosaccharides supplementation resulted in higher ($p < 0.05$) final live weight compared to those fed with diet containing probiotics.

Average daily gain

In the current study, rabbits fed with prebiotic supplemented diet, MOS both at 1.5 and 3 g per kg showed no improvement in ADG when compared to the group fed with control diet (Table 3). Similar result was observed by Castillo *et al.* (2008) and Che *et al.* (2012). However Bovera *et al.* (2012) observed a higher average daily gain in rabbits fed with diet containing 1.5 g MOS per kg.

On contrary to the above observation, Piccolo *et al.* (2009) noticed a significantly

lower daily weight gain in rabbits fed with diet containing 1.0 g MOS per kg than antibiotic supplemented rabbits.

Dry matter intake

Total dry matter intake and average daily dry matter intake of experimental rabbits are shown in Table 3. There was no significant difference in dry matter intake among the dietary treatments. The result of the study was in accordance with the findings of Burkey *et al.* (2004) who reported no improvement in average daily feed intake in pigs fed with diet containing 0.15 per cent MOS. Similarly the present study is also in agreement with the reports of Attia *et al.* (2013).

On the other hand, Kamrani *et al.* (2012) reported that the prebiotic supplemented broiler chicken obtained the highest feed intake.

Feed conversion efficiency

The mean cumulative feed conversion efficiency (kg feed per kg gain) of experimental rabbits maintained on three dietary treatments namely T1, T2 and T3 were 5.77, 6.04 and 5.76, respectively (Table 3). The Statistical analysis on feed conversion efficiency did not reveal any significant difference among three dietary treatments. This observation is in agreement with previous observations of Zhao *et al.* (2012) in pigs and Attia *et al.* (2013).

Supplementation of MOS or bee pollen with or without propolis in rabbits resulted in greater relative economic efficiency (61.9, 55.1 and 27.1%, respectively) and productive performance compared to the control group (Attia *et al.*, 2015).

SUMMARY

In conclusion the supplementations of MOS at 1.5 and 3 g/ kg diet have similar effect in feed intake, body weight and

FCE which is comparable to the control ration. The inclusion of MOS upto 3 g/ kg diet had no additional benefit on growth performance in broiler rabbit.

Table 1. Ingredient Composition of experimental rations, %

Ingredients	Ration		
	T1	T2	T3
Yellow maize	20	20	20
Gingelly oil cake	20	20	20
Soybean meal	17	17	17
Wheat bran	27	27	27
Deoiled rice bran	14	14	14
Mineral mixture	1.5	1.5	1.5
Salt	0.5	0.5	0.5
In addition to 100 kg of above mixture			
Mannan oligosaccharide, g/ kg diet	-	1.5	3
Vitablend AB ₂ D ₃ , g/ 100 kg	20	20	20

Each gram of vitablend AB₂D₃ contains 40,000 IU of vitamin A; 25 mg of vitamin B₂ and 6,000 IU of vitamin D₃.

Table 2. Fortnightly average body weight of rabbits maintained on three dietary treatments, kg

Parameter	Average feed conversion ratio			
	T1	T2	T3	P value
Total dry matter consumed (kg/ animal)	9.05 ± 0.36	9.37 ± 0.65	8.74 ± 0.61	0.73
Average daily dry matter consumed (kg/ animal)	0.09 ± 0.00	0.10 ± 0.01	0.09 ± 0.01	0.73
Total body weight gain, kg	1.58 ± 0.07	1.56 ± 0.06	1.53 ± 0.08	0.88
Average daily gain, kg	0.016 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.96
Feed conversion ratio	5.77 ± 0.31	6.04 ± 0.40	5.76 ± 0.37	0.83

Table 3. Total feed conversion ratio of rabbits maintained on three dietary treatments

Fortnight	Average body weight, kg			
	T1	T2	T3	P value
0	0.43 ± 0.06	0.55 ± 0.09	0.51 ± 0.07	0.58
1	0.66 ± 0.06	0.84 ± 0.12	0.73 ± 0.12	0.5
2	0.90 ± 0.08	1.09 ± 0.15	0.94 ± 0.15	0.59
3	1.18 ± 0.08	1.38 ± 0.15	1.20 ± 0.14	0.51
4	1.45 ± 0.08	1.63 ± 0.14	1.43 ± 0.16	0.52
5	1.70 ± 0.07	1.85 ± 0.13	1.70 ± 0.15	0.64
6	1.87 ± 0.06	1.98 ± 0.12	1.89 ± 0.13	0.77
7	2.01 ± 0.08	2.10 ± 0.12	2.04 ± 0.11	0.83

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