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Effect of Cellulolytic Enzymes and Probiotics on Growth Performance of Broiler Rabbits

D.B. Manjunatha, Y.B. Rajeshwari*, D. Gouri Mahadevappa and J. Shilpa Shree

Department of Livestock Production and Management, KVAFSU, Veterinary College, Hebbal, Bangalore-24, INDIA

**Corresponding author: YB Rajeshwari; Email: lpmhod2014@gmail.com*

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ABSTRACT

Administration of enzymes and Probiotics in fattening rabbits improved growth performance and reduced the morbidity and mortality rate. Apart from Probiotics, enzymes are most important protein molecules which catalyze and improve acceleration of feed digestion. Therefore, keeping the above points in view the present study was undertaken to study the effect of enzymes and probiotics on body weight gain, feed efficiency and digestibility of nutrients. Thirty weaned healthy broiler rabbits with comparable body weights were selected and randomly allotted into three dietary treatments (T1, T2 and T3) of 10 animals each. The effect of enzymes and probiotics on growth performance of broiler rabbits was studied. During the 12^{th} weeks feeding trial, the cumulative daily weight gain of rabbits were 19.30 ± 2.52, 20.25 ± 2.46 and 19.70 ± 2.56 g /day/rabbit under T1, T2 and T3 respectively. It was observed that there was significant ($p < 0.05$) difference between enzyme and control group. The average weekly body weight gain recorded at the end of the trial (during 12^{th} week) was 2097.5 ± 65, 2177.2 ± 77 and 2131.10 ± 70 g rabbit under T1, T2 and T3 respectively. It was observed that there was highly significant ($p < 0.01$) difference between enzyme and control group. Addition of enzymes helps in improving the body weight gain. Hence, can be added to rabbit feed. The following recommendations can be made from the present study that enzyme and probiotics play a very important role in development of immunity against diseases.

Keywords: Enzymes, growth, performance, probiotics, rabbits

In comparison to other livestock, the rabbits posses various advantageous attributes in the sphere of nutrition, it consumes different type of grains, green and hay and also it can be raised on low grains, high roughage diet. Rabbit production on a relatively small scale involving minimal input could make a substantial contribution to the supply of animal protein for human consumption. In present Scenario rabbit farming is gaining popularity as an alternative agricultural enterprise, it can be adopted on rural as well as on urban areas because of its genetic diversity, small body size, rapid growth rate, short gestation interval, high prolificacy, high production potential and ability to utilize forages and their by-products as major dietary components. Hence rabbit industry is one of the potential units among the livestock.

The rabbit digestive system is very complex, fragile and sensitive to enteric diseases and especially when they are exposed to negative impacts, like weaning or heat stress, causing heavy losses. This problem can be avoided by antibiotics. However, the demand for withdrawal of antibiotics from the feed of farm animals represents a challenge for researchers to explore less harmful alternative ways particularly on prophylaxis level such as Probiotics. It has been shown that, Probiotics may have a growth promoting activity by competing with harmful gut flora and stimulating the immune system. The restriction in the use of antibiotics in rabbit nutrition has increased the interest of using alternative natural products that allow maintenance of high productivities and reduction of morbidity and mortality in intensive farming. Apart from probiotics, enzymes are most important protein molecules which catalyze and improve acceleration of feed digestion. Therefore, keeping the above points in view the present study was taken up with the objective to study the effect

of enzymes and probiotics on body weight gain, feed efficiency and digestibility of nutrients.

Instead of using growth promoters with antibiotics that kill some of the rabbit's own gastrointestinal flora, dietary administration of probiotics decreased the frequency of *E. coli* translocation (Lee *et al*., 2000) and was effective in preventing the growth of *E. coli* in the intestine of neonatal rabbits (Tachikawa *et al*., 1998). Probiotics feed additives might potentially benefit the host animal by improving its intestinal microbial balance (Fuller, 1989). Administration of probiotics in fattening rabbits had improved growth performance and reduced the morbidity and mortality rate (Kustos *et al*., 2004; Trocino *et al*., 2005). In the recent review of 14 trials of soybean-based diets for pigs, supplemented with α-1, 6 galactosidases, β-1,4 mannoses, or enzyme complexes, Kim and Baker (2003) concluded that the enzymes had positive effects on growth performances and digestibility in 70% of the cases.

The trials performed by Falcao-e-Cunha *et al*., (2004) and Garcia *et al*., (2005) could not detect any significant effect of enzymes on rabbit's performances. Recent studies reviewed by Yonggang and Samuel (2008) showed that feed conversion in response to enzyme supplementation was age related, with improvements being 10% for pigs of 8–20 kg; 5.3% for pigs of 20–40 kg; and 3% for pigs of 40–60 kg. At the farm level antimicrobial growth promoters (AGPs) help to reduce the disease burden, thus improving performances and animal welfare, disease-preventing and a subclinical disease reducing effect is partly supported by the common observation that AGPs efficiency is inversely related to the hygienic conditions of the farm (Barton, 2000). AGPs like *Saccharomyces cerevisiae* cause improvements in feed efficiency, growth rate and in egg production in the farming conditions. Paulius Matusevičius *et al*. (2004) reported that at the end of the research study, month old New Zealand pedigree rabbits fed on composed fodder containing *YEASTYRE* Probiotics, weighed 310 g or 18 % ($p>0.05$) more than rabbits of the tested group of fed on composed fodder without any additive. Eiben *et al.* (2008) conducted an experiment to compare the effect of probiotic; prebiotic, organic acids and herbal extracts as dietary supplements on growth performance. Health risk was the lowest in the treated groups and highest in the untreated group. Kritas *et al.* (2008) studied to determine the effect of a thermostable probiotics containing *Bacillus licheniformis* and *B. subtilis* on health and production parameters of fattening rabbits from weaning until slaughter and the results showed, when compared to the control animals, Probiotics-treated rabbits were 54 g and 123 g heavier at the end of growing and finishing phases, respectively, and had significantly higher average daily gain.

MATERIALS AND METHODS

Experiment was conducted to evaluate the effect of different levels of enzymes, live yeast *Saccharomyces cerevisiae* and probiotics on performance of broiler rabbits. Thirty weaned healthy broiler rabbits with comparable body weights were selected and randomly allotted to the three dietary treatment groups of 10 animals each, namely T1, T2 and T3. The experimental animals were housed individually in cages, after proper sterilization of these cages. Feed ingredients were procured and experimental feed was prepared at farm unit, Dept of Livestock Production and Management. Experimental feed in the farm of mash was prepared according to ISI Standard (1994). The level of the inclusion of ingredients in the experimental feed is as follows.

Table 1: Ingredients and chemical composition of experimental diet of rabbits

Ingredients	Inclusion (Basal diet)	Parameter	% basis
Maize	50 Kg	Moisture	4.90
Wheat bran	28 Kg	Crude protein	18.12
Soybean	20 Kg	Crude fiber	5.50
Mineral mixture	1.5 Kg	Crude fat	1.12
Vitamins	25000 IU	Total ash	7.50
Salt	0.5%	Metabolizable energy (Kcal/ Kg) = 2770	

The proximate analysis of compound feed (basal diet) was analyzed according to AOAC (1998) and the composition is as follows.

Experimental diet and feeding

Rabbits were acclimatized to mash feed for one week before start of the experiment. During the first week of feeding trail all the treatment groups were fed mash feed *ad li*b, to know the average daily feed intake.

Three dietary treatments employed were as follows

T1: control (Basal diet), T2: Basal diet + 0.5 % Enzymes and T3: Basal diet + 0.1% Probiotics

Note: Probiotic mixture contain Sacchromyces cervices (15 billion CFU/gm Probiotics)

Feeding was done twice daily at 9.30 am and 4.00 PM. Guinea grass was offered at 9.00AM where as concentrate feed was offered at 4.00PM for the entire treatment group. Clean water was made available through out the day during the feeding trail of 12 weeks. The composition of the one gram of enzyme mixture consist of 200 IU of Amylase, 1500 IU of Xyalanase, 250 IU of B-glucanase, 400 IU of Cellulase, 200 IU of Protease, 150 IU of Lipase, 400 IU of Pectinase and 200 IU of Phytase. Rabbits were weighed initially before allotting them to the various dietary treatment groups. Subsequently weekly body weight of the experimental rabbits was recorded till end of the experimental period (that is for a period of 12 weeks). The rabbits were weighed early in the morning before feeding and watering. Average bodyweight gain was calculated from the data collected. One way ANOVA is used as Statistical technique in this study.

RESULTS AND DISCUSSION

Growth Performance

The mean body weight of the rabbits in each group the T1, T2 and T3 was 476.2, 476.2 and 476.1 g respectively. The estimated average daily weight gain (g) of rabbits over 12 week's period is depicted in Table 2.

Table 2: Daily weight gain (g) of rabbits at weekly interval

Weeks	T1 (Mean ± SEM)	T2 (Mean ± SEM)	T3 (Mean ± SEM)
1	15.66 ± 6.88	19.13 ± 6.72	15.76 ± 6.3
2	13.20 ± 7.12	14.83 ± 9.1	16.77 ± 8.12
3	18.96 ± 9.76	17.01 ± 8.1	15.87 ± 9.8
4	16.84 ± 7.1	18.01 ± 7.08	16.87 ± 7.9
5	17.69 ± 6.36	18.54 ± 10.8	19.01 ± 7.3
6	18.71 ± 6	19.04 ± 6	19.56 ± 4
7	19.07 ± 7	21.23 ± 6.00	20.20 ± 7.12
8	19.83 ± 7	20.64 ± 8.52	21.37 ± 612
9	21.01 ± 6.9	21.63 ± 5.6	20.79 ± 6.8
10	22.26 ± 6.64	22.63 ± 5.6	22.24 ± 5.76
11	23.17 ± 5.44	24.51 ± 6.2	23.06 ± 5.2
12	25.21 ± 6.8	25.79 ± 4.44	24.93 ± 5.1
Mean± SEM	19.30 ± 2.52[a]	20.25 ± 2.46[b]	19.70 ± 2.56[ab]

Significant ($p<0.05$) (T1&T2),

The values bearing different superscripts differ significantly. The values bearing similar superscripts showed non-significant.

The average daily weight gain (g) was 15.66 ± 6.88, 19.13 ± 6.72 and 15.76 ± 6.3 respectively for groups T1, T2 and T3, respectively. At the end of the experiment (12 weeks) were 25.21 ± 6.8 (T1), 25.79 ± 4.4 (T2) and 24.93 ± 5.1 (T3). The results reveal that there was increase in the body weight of the rabbits in all the groups. The Average Body Weights of rabbits recorded at weekly intervals up to 12 weeks for groups are presented in Table 2. The weekly changes in Body Weight are shown in Fig. 1.

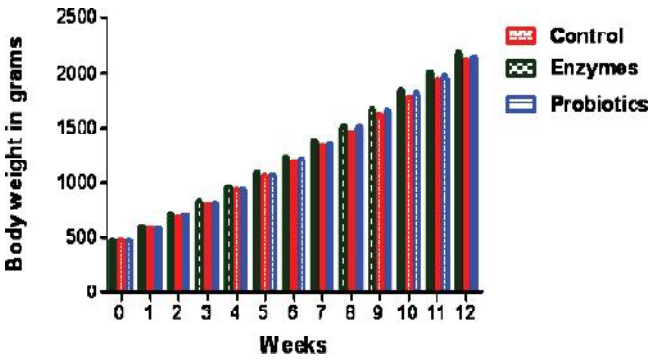

Fig. 1: Weekly growth performance of rabbits

The Average Body Weight (g) of the rabbits before the start of the experiment (o weeks) were 476.2 ± 13.8, 476.2 ± 10.4 and 476.1 ± 11.08 for T1, T2 and T3 groups, respectively where as the body weights at the end of the experiment (12 week) were 2097.5 ± 64.9, 2177.2 ± 76.8 and 2131 ± 69.88 g for T1, T2 and T3 respectively. The results revealed that there was highly significant difference in body weight gain between Control and Enzymes groups ($p<0.001$). Similar findings were reported in steers by Balci *et al.* (2007), in poultry by Dierick and Decuypere (1996). The increase in weight gain in Enzyme groups might be due to increase in the nutrient availability of cell wall carbohydrates. The body weight gain was higher with Probiotics supplemented rabbits (1241.86 gms), When

compared to Control (1220.72 gms), but statistically it was non significant. Similar findings were reported by Abdel (1995), he observed in a two month study, the growth performance was high in Probiotics supplemented groups as compared to Control groups but statistically non significant. This little difference in the values may be attributed to the stimulation of the production of host enzymes, vitamins or antimicrobial substances. The daily changes in weight gain were found to be highly significant between weeks when rabbits supplemented with Enzymes and Probiotics in comparison with control group. But statistically found non-significant among the treated groups. Similar studies were reported in most of the trials conducted by Falcao-e- lunha *et al.* (2004) and Garcra *et al.* (2005) also observed no significant effect on rabbits performance. Similarly the effect of Probiotics on growth performance was studied by Gippert *et al.* (1992). They found that no effect on body weight as well as daily weight gain in growing rabbits.

CONCLUSION

Addition of Enzymes helps in improving the body weight gain. Hence Enzymes and Probiotics can be added to rabbit feed. The following recommendations can be made from the present study that Enzymes and Probiotics play a very important role in development of Immunity against diseases.

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