Comparison of Efficacy of Natural Yeast Cell Wall Polysaccharides (Actigen®) Against Commonly Used Antibiotic Growth Promoters in Broiler Diets in Sri Lanka

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Introduction

Antibiotics have been widely used in animal production for decades in order to obtain high level of production and efficient feed utilization. Even though antibiotic growth promoters show positive effect on the performance of the livestock, use of antibiotics as growth promoters has caused some concerns in public health sectors. Transmission and the proliferation of resistant bacteria via the food chain and presence of harmful residues are the major concerns (Gunal *et al.*, 2006) since Scandinavia and European Union have imposed a ban (Castanon, 2007). The need for developing alternatives is realized and many research studies have been started to identify suitable alternative feed additives that would reduce bacteria penetration and colonization in poultry and perform the same characteristics as the antibiotics.

Many such as probiotics, prebiotics, exogenous enzymes and organic acids have been used with some success. Amongst many, yeast cell wall polysaccharides found to be consumer friendly alternative but the efficacy will vary with environment, management practices and feed. No comparative studies have been done in Sri Lanka.

This study was conducted to determine the efficacy of an alternative, natural yeast cell wall polysaccharides which are having high affinity binders that can bind competitively to bacteria and prevent there binding to bowel cells, to colonize and caused infection. In the study that was compared with the commonly used antibiotic growth promoters in Sri Lanka.

Methodology

The experiment was conducted at the experimental farm of the Veterinary Research Institute (VRI) Gannoruwa, Peradeniya. Three hundred and sixty day old broiler chicks (Cobbe 700) were divided into four treatments with six replicate groups of 15 chicks and were offered common basal diet supplemented either with natural yeast cell wall polysaccharide extract or commonly used antibiotic growth promoters (Bacitracin Methylene Disalicylate, Avilamycine) at recommended commercial levels and compared with negative control with no growth promoters for period of five weeks.

Four treatments were T1- Basal diet + Bacitracin Methylene Disalicylate, T2- Basal diet + Avilamycine, T3- Basal diet + Natural Yeast Cell Wall extract and T4- Basal diet only (control diet).

Weekly average group body weight, average feed intake and daily mortality were recorded and the average group body weight gain & average feed gain ratio were calculated. Subsequently, five birds from each replicate were killed and carcass weight, liver, heart, gizzard and pancreas weights were recorded. Average dressing percentage was calculated. Data were analyzed using one way ANOVA with aid of statistical software Genstat.

Results and Discussion

Results of cumulative body weight gain, feed intake and feed conversion ratio are given in the Table 1.

Table 1: Cumulative body weight gain, feed intake, and FCR of broiler birds

Parameter		T1	T2	T3	T4	SED
Cumulative body weight gain (g)						
Day	0-7	134.6	132.8	136.9	136.9	2.2
	0-14	434.1	422.2	434.9	431.2	7.6
	0-21	909.2	881.5	914.4	905.5	0.3
	0-28	1417.5^{a}	1351.7^{b}	1411.2^{a}	1341.2^{b}	22.4
	0-35	2026.0	1952.0	2033.0	1983.0	60.0
Cumulative feed intake (g)						
Day	0-7	167.9	162.2	165.6	168.6	4.5
	0-14	590.1	595.2	574.5	577.2	18.9
	0-21	1257.1	1238.6	1249.3	1253.4	17.2
	0-28	2129.5	2098.1	2105.8	2062.8	26.7
	0-35	3099.0	2987.0	3032.0	3010.0	63.4
Cumulative Feed conversion ratio						
Day	0-7	1.248	1.214	1.211	1.231	0.035
	0-14	1.362	1.411	1.321	1.339	0.050
	0-21	1.385	1.409	1.366	1.385	0.037
	0-28	1.503	1.554	1.492	1.539	0.029
	0-35	1.522	1.533	1.491	1.530	0.033

As results revealed there is no significant difference between the body weights in different treatment groups ($P>0.05$). However, it is noted that the body weights of T4 and T2 groups were significantly lower than that of T3 & T1 groups for the first four weeks and that in almost every weighing point, body weight tended to be higher in T1 & T3 groups than that of T2 & T4. Additives are more effective when the birds are reared under poor sanitary conditions and challenged by high microbial load. However, the pen that we used for the experiment was quite new and has had no birds for last three months. This may have

resulted in comparatively less microbial challenge for birds in the present experiment and hence the difference was only little evident. Nevertheless the trend is quite obvious that T1 & T3 diets were quite superior to T2 & T4 diets and both were equally effective as far as the growth is concerned. Had the experiment done in an actual farm situation where microbial challenge is severe, results would have been far more conclusive. In previous research natural yeast cell wall extract had been used as concentrated feed additive to improve body weight gain and feed conversion ratio, livability and performance index of animals, compared to unsupplemented diets (Ferket *et al.*, 2002) with success, our results too is supportive of their use.

According to Table 1 feed intakes and the FCR of all the treatment groups had significant difference ($p<0.05$). However, birds fed on T3 diet had relatively better FCR than any other treatments though not statistically significant. Hoog, in 2004 found that, natural yeast cell wall extract containing diet was found to produce comparable FCR with antibiotic supplemented diet in broilers. As explained earlier, quite hygienic conditions in the pens may have hindered certain effects. Also more similar to these results, research conducted by Flemming *et al.*, (2004) on the effect of inclusion of Mannan Oligo Saccharides (MOS) in the diet on the studied parameters (feed intake, daily weight gain, feed conversion ratio) were significantly higher compared to the inclusion of cell wall or to the control diet but the effect was not different as compared to the inclusion of growth promoters. However trend supports the notion that yeast cell wall extracts improves the utilization of feeds in broiler chickens. Nevertheless in the absence of statistical evidence makes it inconclusive. However, in commercial point of view little improvement of point of FCR is very valuable in profit making.

According to the results of the carcass characteristics (Table 2) there is no significant difference in the carcass weights and dressing percentages ($p<0.05$). T3 had the highest carcass weight compared to control but yet again without any statistical significance.
The organ analysis indicates that there is no significant difference in the organ weights except weights of pancreases. However, there is no apparent explanation for the difference. However carcass traits in terms of eviscerated yield of heart and gizzard were not different due to the dietary treatments confirming the earlier reports (Elangovan *et al.*, 2005).

Table 2: Effects of different dietary treatments on carcass characteristics

Parameter	T1	T2	T3	T4	SED
Average carcass Weight (g)	2195.0	2183.0	2213.0	2120.0	59.2
Dressing %	75.43	75.09	75.67	75.11	0.99
Gizzard: Carcass ratio	0.018	0.019	0.018	0.020	0.00
Heart: Carcass ratio	0.004	0.004	0.004	0.004	0.00
Liver: Carcass ratio	0.026	0.026	0.026	0.0298	0.001
Pancreas: Carcass ratio	0.0034	0.0029	0.003	0.003	0.00

Conclusion

The results of this study indicate that natural cell wall polysaccharides are equally good as best antibiotic growth promoters available in the market. In fact, it is even better in certain attributes. Therefore, they can replace antibiotics in broiler diets without any loss of performance in broilers which has a huge significance as far as the public health is concerned.

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