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Original Article

Effect of dietary inclusion of Aloe Vera (*Aloe barbadensis*) and yeast (*Saccharomyces Cerevisiae*) powder on growth performance of broilers

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ABSTRACT

The purpose of this research work was to evaluate the Aloe vera (*Aloe barbadensis*) and Yeast (*Saccharomyces Cerevisiae*) powder. A total of 72 (Arbor-Acres) day old chicks were used in this study. Four levels of an Aloe vera and Yeast powder at the rate of 0.00%, 0.50% (Yeast), 0.50% (Aloe vera), and 0.50% Yeast + 0.50% Aloe vera were incorporated into the basal diet for six weeks. Feeding period for all groups was lasted for 42 days. Results revealed a significant effect of Aloe vera and Yeast powder in feeds on mean body weights per broilers and mean feed conversion ratio per broilers in 5^{th} week ($P<0.05$) were significantly on feed supplemented with 0.50% Yeast + 0.50% Aloe vera powder. It was concluded from this study that 0.50% Yeast + 0.50% Aloe vera powder feed supplemented has a beneficial impact on the growth performance of broilers chicks.

Key words; Broilers, Yeast, Aloe vera, Growth and Performance

INTRODUCTION

It is well documented that antibiotics have a beneficial effect on animal growth, performance and health. However, increasing concerns regarding overuse of antibiotics has promoted extensive investigation into alternatives to use the sub-therapeutic antibiotics in production yeast (Gao *et al.,* 2008). Yeast, which is known as "Baker Yeast" is rich in crude protein (40-45%) and vitamin B complex. Yeast extracts have been widely reported as successful growth promoter in poultry industry (Savage and Zarrewska, 1996 and Spring, 2002). Gao *et al.* (2008) noted that other mechanisms may be responsible for the effects of YC in monogastric other than modulation of microbial ecology. Mannan-oligosaccharide and 1,3 and 1,6 β –glucan are components of the YC wall that modulate immunity (Shashidhara and Devegowda, 2003), promote growth of intestinal microflora (Spring *et al.*, 2000) and increase growth (Parks *et al*., 2001). Lutful Kabir (2009) noted that the mode of action of dry yeast in poultry includes: (i) maintaining normal intestinal microflora by competitive exclusion and antagonism: (ii) altering metabolism by increasing digestive enzyme activity and decreasing bacterial enzyme activity and ammonia production: (iii) improving digestion, and (iv) stimulating the immune system. From the previous interesting observation, and as it is well known that the performance of the bird is a reflection of its physiological activity, therefore, the objective of this study was to evaluate the effect of supplementing dry yeast in broiler diet as a natural feed additive on growth performance, carcass traits, some blood parameters and economical efficiency of broiler chicks from 1- 42 days of age. Nigeria, like many other countries belonging to the Low-Income Food Deficit Countries (LIFDC), is faced with the problems animal protein deficiency (Igene *et al*., 2007; Mmereole, 2008). For more than three decades, large scale poultry production has been identified as the fastest and the cheapest means of bridging the animal protein deficiency gap (Sonnaiya *et al*., 1977). Unfortunately poultry production in Nigeria has been inundated by certain critical problems such as lack of high quality parent stock, stunted growth, high feed costs, diseases and absence of organized marketing channels. The major factors that can dictate the success or failure of any poultry venture include the ability to stock breeds of high genetic potentials, balanced nutrition and adequate health status. However, there is a greater need to produce high quality meat and eggs at the shortest possible time and at the lowest

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possible cost, hence the use of antibiotic supplements in poultry production as growth promoters. Antimicrobial agents have been used as feed supplements in poultry feeds to enhance growth. Unfortunately, in the recent years, there has been growing concern about the use of these antibiotics as growth promoters especially in broiler production due to possible development of both drug resistance, cross resistance and multiple resistances (Neu, 1992; Sinurat *et al*., 2002; Rangasamy and Kalaiarasil, 2007; Mehala and Moorthy, 2008; Abd El-Hakim *et al*., 2009). As a consequence, attempts have been made to replace antibiotics with possible alternative growth promoters such as probiotics, prebiotics and additives of plant origins such as herbs, spices and various plant extracts. A search for such alternative growth prompters has stimulated great interest on the use of herbs as feed supplement in broiler diet. Various edible herbs have studied for their antimicrobial and growth promoting abilities (Cross *et al*., 2002; Demir *et al*., 2003; Cross *et al*., 2007). The utilities of these herbs have been felt mainly in human medicine. For example, Aloe vera has been credited with several remedies such as its effect on dental health, healthy digestion, immune support, growth enhancement and repair of collagen and elastin (Ernst *et al*., 2002).This experiment was, therefore designed to test the effectiveness of Aloe vera as a growth promoter as well as to evaluate its effects on the haematological parameters and performance characteristics of the broiler chickens.

MATERIALS AND METHODS

A total of 72 DOC of same hatch were randomly distributed into four groups i.e. T_1 (Control), treatment T_2, T_3 and T_4 with six sub groups comprising of three birds in each. Broilers in T_1 were fed diet as per (NRC, 1994) standard (CP 22 and ME 2900) but broilers in T_2, T_3 and T_4 were fed standard ration supplemented with 0.50% (Yeast), 0.50% (Aloe vera), and 0.50% Yeast + 0.50% Aloe vera powder. All broilers were offered feed and water *ad libitum* throughout the experimental period. They were housed in metal type battery cages in small animal laboratory of S.S. and AH Dairying, SHIATS Allahabad. A bulb of 15 watt was left on in each cage. Initial weight of each chick was recorded on arrival and then weekly.

Table 1: Ingredient and nutrient composition of experimental diet (%DM)

Ingredients (%)	Broiler starter (0 – 21 days)	Broiler finisher (22 – 42 days)
Maize	60.00	63.00
Ground nut cake	23.11	18.00
Fish meal	12.60	14.60
Premix*	2.50	2.50
Salt	0.30	0.30
Methionine	0.10	0.01
lysine	0.10	0.01
Di-calcium phosphate	1.20	1.20
Total	100	100
Calculated Chemical analysis		
Moisture (%)	6.29	6.22
Crude Protein (%)	23.29	21.28
Total Ash (%)	8.02	9.34
CP	22.00	19.00
ME (Kcal/Kg)	2900	3000
Calcium (%)	0.69	0.52
Available phosphate(%)	0.74	0.69
Methionine(%)	0.33	0.31
Lysine(%)	1.19	1.08

*Premix (2.5%) Provided the following (Per Kg of complete diets). Vit A. 367500 IU,133500 IU Vit. D3, 1920 mg Vit.E, 84.42 Vit. K3, 50 mg Vit. B1, 150 mg Vit. B2, 500 mg Vit. B3, 177.5 mg Vit. B6, 0.8 mg Vit. B12, 600 mg Vit. PP, 24.5 mg folic acid, 27 mg biotin, 5767.5 mg choline, 2667 mg Fe, 333.75 mg Cu, 3334.06 mg Mn , 203 mg Co , 2334.38 mg Zn , 100.75 mg Ca , 10 mg Se, 65446.46 mg Ph, 36667.5 mg DLMithionine, 200.02mg, Ethoxyquin,50mg Flavophospholipol, 30g Fish meal, 1800g wheat bran.

Green Aloe vera leaves were dried for three to four days initially and then in oven at 60ºC up to moisture content level below 10%. Then the leaves were crushed manually to make it fine. It was passed through fine meshed wire sieve to obtain uniform powder. Then it was mixed with standard

feed mixture according to the ratio mentioned. Chicks were provided 0.8 sq.ft/bird space. Cages, feeders, waterers, and other equipments were properly cleaned disinfected and sterilized before use. The waterers were disinfected with 0.02%KMnO4 solution every day. The average live body weight, body weight gain, feed intake, mortality percent and feed conversion ratio were measured on weekly basis. The Data obtained were subjected to statistical analysis using ANOVA. In case of significance difference Duncan Multiple Range Test was applied.

RESULTS AND DISCUSSION

Data on mean body weights per broiler, mean feed intake per broiler, mean weight gain per broilers and mean feed conversion ratio per broiler are weekly shown in Table 2, 3, 4, 5. The results showed that use of live yeast of *Saccharomyces cerevisiae* and Aloe vera (*Aloe barbadensis*) had no significant effect on mean weight gain per broilers (Table 3) and mean feed intake per broilers (Table 4). Mean feed intake per broilers and mean weight gain per broilers were non significant in control and treated groups. It is interesting to note that the beneficial effect of this plant is not due to better feed efficiency, since feed intake was non significant between control and treatment groups. However, the mean body weight per broilers (Table 2) and mean feed conversion ratio per broilers (Table 5) are significantly effect on 5th week of the experiments but 1st, 2nd, 3rd, 4th and 6th, week having no significant effect. In this experiment, we obtained better mean body weight per broilers and mean feed conversion ratio (5th week) in treatment group having treated 0.50% Yeast + 0.50% Aloe vera powder feed supplemented. Our findings are similar to Al-Homidan and Fahmy, (2007) Yeast, which is known as "Baker Yeast" is rich in crude protein (40-45%) and vitamin B complex. Yeast extracts have been widely reported as successful growth promoter in poultry industry. The present increase in muscle weight may be due to the mode of action of dry yeast in poultry includes and maintaining normal intestinal microflora by competitive exclusion and antagonism hence altering metabolism by increasing digestive enzyme activity and decreasing bacterial enzyme activity and ammonia production hence the improving digestion reported by Lutful Kabir (2009).

Table 2: Mean body weights (g) per broiler at different weeks of age in four different treatments

Weeks	Treatments			
	T_1	T_2	T_3	T_4
0 (Day old)	43.00±1.05	43.50±1.27	43.67±1.14	43.83±1.21
1	138.33±2.75	138.33±2.31	146.33±2.67	148.83±2.43
2	310.17±2.76	321.50±2.86	342.17±2.32	356.83±2.76
3	587.00±3.05	608.50±3.21	643.33±3.56	716.00±3.07
4	874.83±3.42	910.83±3.15	966.17±3.76	1065.50±3.23
5	1291.33±3.85^{a}	1327.00±3.95^{ab}	1376.50±3.86^{ab}	1485.33±3.04^{b}
6	1716.00±3.05	1752.67±4.03	1806.57±3.87	1927.00±3.97

Values (Mean± SE) with different superscripts in a row differ significantly (P<0.05); T_1=Control; T_2= 0.50% Yeast (*Saccharomyces Cerevisiae)* powder; T_3=0.50% Aloe vera (*Aloe barbadensis)* powder; T_4=0.50% Yeast + 0.50% Aloe vera powder in basal diet.

Table 3: Mean feed intake (g) per broiler at different weeks of age in four different treatments

Weeks	Treatments			
	T_1	T_2	T_3	T_4
1	165.70±2.23	154.60±2.31	158.10±2.41	142.10±2.26
2	316.21±2.42	315.78±2.34	314.94±2.37	306.62±2.42
3	534.59±2.48	526.00±2.14	523.78±3.05	499.00±2.65
4	558.33±2.86	557.31±2.49	551.89±2.76	546.31±2.58
5	756.23±2.68	733.10±2.69	738.02±2.85	686.68±2.95
6	763.38±3.15	696.15±2.87	669.52±2.75	646.56±2.59

Values (Mean± SE) with different superscripts in a row differ significantly (P<0.05); T_1=Control; T_2= 0.50% Yeast (*Saccharomyces Cerevisiae)* powder; T_3=0.50% Aloe vera (*Aloe barbadensis)* powder; T_4=0.50% Yeast + 0.50% Aloe vera powder in basal diet.

Table 4: Mean body weight gain (g) per broiler at different weeks of age in four different treatments

Weeks	Treatments			
	T_1	T_2	T_3	T_4
1	95.33±1.28	94.83±1.37	102.67±1.43	105.00±1.36
2	171.83±1.87	183.17±1.95	195.83±1.75	208.00±1.45
3	276.83±2.05	287.00±2.43	301.17±2.42	359.17±2.65
4	287.83±1.87	302.33±2.42	322.83±2.42	349.50±2.38
5	416.50±2.68	416.17±2.34	410.33±2.75	419.83±2.47
6	426.67±2.57	425.67±2.48	430.17±2.51	441.67±2.75

Values (Mean± SE) with different superscripts in a row differ significantly (P<0.05); T_1=Control; T_2= 0.50% Yeast (*Saccharomyces Cerevisiae)* powder; T_3=0.50% Aloe vera (*Aloe barbadensis)* powder; T_4=0.50% Yeast + 0.50% Aloe vera powder in basal diet.

Table 5: Mean feed conversion ratio (g) per broiler at different weeks of age in four different treatments

Weeks	Treatments			
	T_1	T_2	T_3	T_4
1	1.74±0.05	1.64±0.04	1.55±0.08	1.37±0.07
2	1.84±0.25	1.73±0.15	1.61±0.09	1.47±0.12
3	1.93±0.26	1.84±0.20	1.74±0.31	1.39±0.31
4	1.98±0.27	1.90±0.06	1.75±0.42	1.59±0.41
5	$1.88±0.24^{b}$	$1.76±0.12^{ab}$	$1.82±0.32^{ab}$	$1.72±0.26^{a}$
6	1.79±0.05	1.67±0.21	1.54±0.31	1.49±0.08

Values (Mean± SE) with different superscripts in a row differ significantly (P<0.05); T_1=Control; T_2= 0.50% Yeast (*Saccharomyces Cerevisiae)* powder; T_3=0.50% Aloe vera (*Aloe barbadensis)* powder; T_4=0.50% Yeast + 0.50% Aloe vera powder in basal diet.

After many research studies on animal and human being, Sinurat, et al. (2002) reported that Aloe vera bioactives as feed additive: the effect of different forms and levels of bioactives on performances of broilers. Therefore, there is likelihood that improved metabolism has beneficial impact on weight gain of the studied muscles. Gomez et al. (1998) concluded that the improvement in live body weight in broilers may be due to antibacterial related to flavonoids in *Aloe barbadensis* that led to maintaining normal intestine microflora by competitive exclusion and antagonism, altering metabolism and increased liver and muscle glycogen contents. In conclusion it can be said that 0.50% Yeast + 0.50% Aloe vera powder feed supplemented of drinking water produced positive results in broiler chicks. It may also decrease the market age of broilers and reduce their rearing cost.

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