Effect of Baker's yeast (*Saccharomyces cerevisiae*) inclusion in feed on performance of broiler birds

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Abstract

This study was designed to investigate the effect of Baker's yeast (Saccharomyces cerevisiae) inclusion in feed on the performance of broiler birds. The study was laid out in Completely Randomized Design with each treatment replicated thrice.The study was carried out at the Teaching and Research Poultry Farm of Michael Okpara University of Agriculture, Umudike, Umuahia, Abia State, Nigeria for 8 weeks. A total of 150 Anak broiler chicks were used for the study. Graded levels (0.5g kg-^{1}, 1.0g kg-^{1}, 1.5g kg-^{1} and 2.0g kg-^{1}) of yeast in feed were given ad libitum only by day during the starter and finisher phases. Starter and finisher diets were formulated using Excel feed formulation and feeding models (Onwurah, 2011) and analyzed using Association of Official Analytical Chemists (AOAC,2000) while all data were analyzed using Statistical Package for Social Sciences (SPSS, 2006). Results of yeast supplementation in feed had significant effect (P=0.05) on broiler performance. Best results were in yeast inclusion levels of 0.5g and 1.0g at the starter and finisher phases respectively.This study recommends 0.5g yeast inclusion in feed.

Key words: Yeast, Performance, Yeast inclusion and Anak broiler.

Introduction

The goal to expand poultry industry in Nigeria, according to Babatunde and Hamzat (2005), depends to a large extent on the availability of good quality feed in sufficient quantity and affordable prices that farmers could afford. According to Ibiyo and Atteh (2005), the cost of poultry feed has been on the increase and could constitute up to 80% of the total production cost. Yeast (*Saccharomyces cerevisiae*) appears potentially useful as it has been shown to improve feed digestibility and meat colour (Ezema *et al*., 2009). Yeast has also been reported as a feed quality enhancer as it has anti-microbial properties (National Livestock Research Institute, 2007) and may be a good alternative to antibiotic growth promoters (Shen *et al*., 2009). Live yeast augments digestive processes by initiating the process of fermentation, and a source of digestive enzymes of various kinds. The survivability of live yeast in chicken intestine is well established.

Saccharomyces cerevisiae is considered one of the live microorganisms that when administered through the digestive tract have a positive impact on the host health through its direct nutritional effects (Patterson and Burkholder, 2003). Yeast boosts immune level resulting in a better protection against infections (Panda *et al*., 2000). The benefits of *Saccharomyces cerevisiae* to the immune system and on coccidial infection have been reported by Gao *et al*. (2008). Likewise, Jeannine *et al.* (2012) and Silva *et al.* (2012) had reported its beneficial effect on Newcastle disease.

Sccharomyces cerevisiae has unidentified growth factor or unidentified growth ('plus') factor (Paryard and Mahmoudi, 2008). Yeast could therefore be a performance enhancer through improvement in protein utilization and significant retention of crude fibre, and thus confirming yeast as possessing the ability to degrade fibrous materials in poultry feeds. Ordinarily, poultry lack the enzymes (cellulases, hemi-cellulases and xylanases) to digest high fibre diets (Oyedeji, 2008).

A number of researches has been conducted using enriched-yeast in livestock (Downs *et al.*, 2011) and in poultry, non-enriched yeast has been used (Ezema, 2009) and in fish (Aghdamshahnar *et al*., 2006). Pelicia *et al*.(2010) also reported that fermented yeast extracts are rich in mannan-oligosaccharides, β-gluccans and other nutritional metabolites that may optimize gut health and immunity, which translates to better growth performance and lower risks of disease-borne pathogens. Glucans extracted from *Saccharomyces cerevisiae* (baker's yeast) is one such type and is an important structural element of the yeast cell wall. Yeast glucans are polysaccharides composed of smaller units linked together by β-1,3 bonds. These bonds hold the glucan molecule together, hence the name, β-1,3 glucan. The mode of action of β-1,3 glucan is that there is a specific receptor for β-1,3 glucan on the surface of macrophages that when activated, stimulates a cascade of events turning the body into "an arsenal of defense". There is now evidence to show that glucan is, from an evolutionary point of view, the most widely and commonly observed macrophage activator in nature and is proven to overcome the negative effects of immunosuppression (FISON, 2013).

This study was conducted using non-enriched (Angel white label[R]) yeast to investigate the effect of yeast (*Saccharomyces cerevisiae*) as feed additive on the performance of broiler chickens.

Materials and Method

This study was carried out in the Teaching and Research Poultry Farm of Michael Okpara University of Agriculture Umudike, Nigeria, using 150 Anak broiler chicks. Graded levels (0.5g kg-^{1}, 1.0g kg-^{1}, 1.5g kg-^{1} and 2.0g kg-^{1}) of yeast were given *ad libitum* only by day throughout the trial period. The treatments were replicated thrice with 10 chicks per replicate. Performance parameters weighted and recorded daily were daily feed intake and daily weight gain. Daily protein intake (%CP * Daily feed intake), feed conversion ratio (Feed intake/Weight gain) and protein efficiency ratio (Daily weight gain/Daily protein intake) were calculation and recorded while mortality was by counting. Diets were formulated using Excel feed formulation and feeding models (Onwurah, 2011). Proximate chemical analysis of diets was conducted using the methods of the Association of Official Analytical Chemists (AOAC, 2000). All data were analyzed using Analysis of Variance (Steel and Torrie, 1980) and means separated using Duncan's Multiple Range test (Duncan, 1955) using Statistical Package for Social Sciences (SPSS,2006).

Table 1.0: Starter and fisher diets compositions

INGREDIENTS (%)	BROILER STARTER	BROILER FINISHER
MAIZE (%)	50.00	50.00
SOYBEAN (%)	33.00	28.00
PALM KERNEL CAKE(%)	14.00	18.00
BONE MEAL(%)	3.00	3.00
SODIUM CHLORIDE(%)	0.25	0.25
TOTAL (%)	100.00	100.00
CALCULATED ANALYSIS		
CRUDE PROTEIN (%)	22.04	20.56
ME/MJ/KG	14.45	14.67

This is with the protein and energy level as recommended (Oluyemi and Robberts, 2000).

Table 1.1: Proximate chemical analysis of Starter and finisher diets

INGREDIENTS	BROILER STARTER	BROILER FINISHER
CRUDE PROTEIN (%)	22.15	20.1
ETHER EXTRACT(%)	3.8	4.5
ASH(%)	7.51	7
CRUDE FIBRE(%)	3.8	5
NITROGEN FREE EXTRACT(%)	52.74	54.4
METABOLISABLE ENERGY(MJ/KG)	14.45	14.67

Vitamin/mineral premix supplying Vitamin A (1500 IU), Vitamin D3 (1600 IU),Riboflavin (9.0mg), Biotin (0.25mg), Pantothenic acid (11.0mg), Vitamin K (3.0mg),Vitamin B2(2.5mg), Vitamin B6 (0.3mg), Vitamin B12 (0.8mg), Nicotinic acid (8.0mg), Iron (5mg), Selenium (0.01mg), Magnesium (10.0mg), Zinc (4.5mand Cobalt (0.02mg) / Kg

Results and Discussion

Table 2.0:Effect of graded levels of yeast fed in feed on the performance of broiler starter

Parameters	**0g**	**0.5g**	**1.0g**	**1.5g**	**2.0g**	**SEM**
Initial Liveweight(g)	115.33	166.00	166.00	166.00	166.00	0.23
Final Liveweight(g)	538.89^{b}	615.05^{a}	613.67^{a}	607.00^{a}	613.89^{a}	10.02
Daily Weight Gain (g)	20.17^{b}	23.76^{a}	23.68^{a}	23.38^{a}	23.69^{a}	0.47
Daily Feed Intake(g)	55.57^{c}	58.82^{a}	58.55^{ab}	58.30^{ab}	56.55^{bc}	0.42
Feed Conversion Ratio	2.77^{a}	2.48^{ab}	1.83^{b}	1.81^{b}	1.89^{b}	0.13
Daily Protein Intake (g)	12.31^{c}	13.03^{a}	12.97^{ab}	12.97^{ab}	12.53^{bc}	0.09
Protein Efficiency Ratio	1.64^{b}	1.83^{ab}	1.83^{ab}	1.81^{ab}	1.89^{a}	0.13
Mortality	0.00	0.00	0.00	0.00	0.00	0.00

a,b,c Means within the same rows with the same superscripts are not significantly (P>0.05) different.
SEM = Standard error of mean.

The performance of starter broilers fed graded levels of yeast in feed is presented in Table 2.0. All starter broilers fed graded levels of yeast in feed had significantly (P<0.05) higher daily weight gain , daily feed intake and final live weight than those than the control birds. Daily protein intake also followed exactly the same pattern with daily feed intake and there were significant (P>0.05) differences among the starter broilers fed graded levels of yeast in FCR and protein efficiency ratio. The yeast inclusion groups had better feed conversion and protein efficiency ratios. There was no mortality between treatments.

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Table 2.1:Effect of graded levels of yeast fed in feed on the performanc of broiler finisher

Parameters	0.0g	0.5g	1.0g	1.5g	2.0g	SEM
Initial Liveweight (g)	538.89^{b}	615.05^{a}	613.67^{a}	607.00^{a}	613.89^{a}	10.10
Final Liveweight (g)	1957.66^{b}	2184.67^{a}	2297.33^{a}	2174.33^{a}	2270.33^{a}	36.91
Daily Weight Gain (g)	50.67^{b}	56.06^{ab}	60.13^{a}	55.97^{ab}	56.06^{ab}	1.14
Daily Feed Intake (g)	112.29^{b}	118.08^{ab}	127.18^{a}	123.52^{ab}	117.4^{ab}	2.01
Feed Conversion Ratio	2.23	2.11	2.12	2.2 0	1.99	0.04
Daily Protein Intake (g)	22.57^{b}	23.73^{ab}	25.56^{a}	24.83^{ab}	23.60^{ab}	0.04
Protein Efficiency Ratio	2.25	2.38	2.36	2.25	2.52	0.05
Mortality	0.00	0.00	0.00	0.00	0.00	0.00

a,b, Means within the same rows with the same superscripts not significantly (P>0.05) different. SEM = Standard error of mean.

All finisher broilers with yeast supplementation in feed had significantly (P<0.05) higher daily weight gain and had final live weights more than those fed 0g yeast in feed as shown in Table 2.1. Daily live weight gain was similar in the birds fed 0.5g and 1.5g; and in those fed 1.0g and 2.0g yeast in feed. Final live weight was significantly (P<0.05) different for all yeast treatments against the control group. Daily feed intake and protein efficiency ratio followed the same pattern with significantly (P<0.05) higher feed intake recorded by birds fed 1.0g yeast in feed than those fed 0.5g, 1.5g and 2.0g yeast. Feed intake in the control group was significantly (P<0.05) lower than the others that were similar. No significant (P>0.05) difference existed between birds fed 0g, 1.0g, 1.5g and 2.0g yeast in FCR, protein efficiency ratio and mortality. Daily protein intake was of the same pattern with daily feed intake.

The improved performance could be attributed to beta-glucans which has growth promoting and immune-enhancing effects in broiler chickens (Park *et al*., 2001). This results agree with Ghasemi (2006), who reported significant improvement in body weight gain and feed conversion ratio in chicks fed live yeast (Sc47) and Raju *et al.(*2006), who reported that up to 200mg of yeast per kg diet improved feed efficiency of broilers.

Conclusion This study recommends the inclusion of baker's yeast in feed of broiler in the finisher diets. 5.0g yeast can be supplemented in feed in the starter phase but should not exceed 1.0g in the finisher phase. This report agrees with Adejumo *et al*. (2005), who reported that yeast supplementation at the starter phase is more effective for promoting feed conversion and body weight gain than that applied at the finisher phase of broiler production.

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