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STUDY OF DIFFERENT LEVELS OF YEAST ON PERFORMANCE VALUES AND IMMUNE RESPONSE IN BROILER CHICKEN

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Abstract

This study was conducted to evaluate the addition of three levels of dry yeast (0.1, 0.2, and 0.3%) and Neomycin on the broiler performance and immune responses. Hundred and five unsexed day – old Aber acer strain broiler chicks of average weight of 43 grams were subjected to 43 days experimental period. The chicks were distributed randomly into (5) groups with (3) replicates each with 7 chicks. Treatments groups (A) represent control, (B) is control diet supplemented with Neomycin and groups C, E and D were supplemented with 0.1%,0.2% and 0.3% dry yeast (Saccharomyces cereviase) respectively. Results showed that chicks fed on 0.3% dry yeast (s .c) had significantly (P < 0.05) higher body weight gain (BWG) and the best feed conversion ratio (FCR) (1.8). There is no significant (P > 0.05) difference in feed intake (FI) among all treatments. The group of chicks fed with 0.3% yeast compared to all tested groups had the lowest abdominal fat and highest carcass yield. With respect to immune response chicks groups fed n different levels of yeast (0.1%,0.2%,0.3%), results obtained regarding antibodies titer of vaccination, showed no significant difference among treatments groups after the use of (IBD-D78) vaccine but when yeast level of 0.3% is used there is a high antibodies titer difference between the treatments of neomycin and control group .With application of (0.1% 0.2% and 0.3%) yeast levels respectively, there is a high antibodies titer of vaccine (NDV) in both readings of (18days and 43days of age) of vaccination program. In conclusion, results of this study indicated that supplementation of 0.3% yeast could improve performance values in body weight gain, feed conversion ratio and increase rate of carcass dressing. Likewise, the group treated by 0.03% yeast recorded highly titer antibodies at 18 days which indicate detection of solid immunity. It can be deduced from this study that ELISA can employ for diagnosis and detection of anti-body titer in vaccination program due its accuracy, sensitivity and urgency.

Keyword: Saccharomyces cerevisiae, performance, Immune responses, ELISA

1. INTRODUCTION

Over the last several years considerable attention has been given to use of probiotics. Most interests have been generated because of increased public awareness and objection to use antibiotic as growth promoter (Al-Homidan and Fahmy, 2007). The mode of action of yeast products is yet needed to be clarified. Some studies have confirmed the effect of yeast culture (YC) in increasing concentrations of commercial microbes or suppressing pathogenic bacteria (Stanley et al., 2004). However, these effects were not reported by others (White et al., 2002 and Van Heugton et al., 2003). Saccharomyces cerevisiae also known "baker's yeast" is one of the most widely commercialized species and one of the effective adsorbents which is rich in crude protein (40-45%) and its biological values were high and also rich in vitamin B complex, biotin, niacin, pentatonic acid and thiamin (Reed and Nagoda, 1999). Results of previous studies with yeast fed to chickens however, have not been consistent. It has been reiterated (Bonomi and Vassia, 1978; Onifade et al., 1998) that feeding yeast to chicks improves body weight (BW) gain and feed conversion ratio. In contrast, Madriqal et al., (1993) failed to observe a positive result of feeding yeast on BW on broiler chicks. Kanat and Calialar, (1996) reported that active dry yeast effectively increases BW gains without affecting feed conversion ratio. Onifade et al., (1999) reported that supplementation of yeast to broiler diets improves feed/gain ratio but not growth rates. Recently, it has been reported that yeast could be an alternative to antibiotic based drugs in feeding broiler chicks (Hooge et al., 2003) or on recycled litter (Stanley et al., 2004). It is well documented that antibiotics have beneficial effect on animal growth performance and health. However, increasing concerns regarding over-use of antibiotics has promoted extensive investigations into alternative to use the Sub-therapeutic antibiotics in production yeast (Gao et al., 2008). The antibiotic in continued use tends to stimulate development of resistance from harmful microorganism. There is currently an outcry from the consumer society and health sector to ban their use as feed additives in animal and poultry feeds (Cavazzoni et al., 1998). Lutful Kabir (2009) noted that the mode of action of dry yeast in poultry includes: maintaining normal intestinal microflora by competitive exclusion and antagonism: and altering metabolism by increasing digestive enzyme activity and decreasing bacterial enzyme activity and ammonia production; improving digestion, and stimulating the immune system.

The Objectives behind this study are to evaluate the effect of supplementing different levels (0.1, 0.2, and 0.3%) of dry yeast as a natural feed additive in

comparison with antibiotic and control group (un-treated) on the growth performance and immune responses of broiler chicken.

2. MATERIAL AND METHODS

The present study was conducted at private broiler chicks farm located in, College of Agricultural Studies, Sudan University of Science and Technology -Shambat-Sudan. The design used was completely randomized design, with dietary levels of (0.1%, 0.2%and0.3%) and control and neomycin. Each treatment had three replicates of (7 chicks /each); chicks were reared in pens with litter from one day to 43 days of age under similar managerial and hygienic conditions. Feed and water were provided a dlibitum. The first group was used as control (A) fed on the basal diet, the second is group (B) fed with basal diet supplemented with neomycin (1g/kg), the third, fourth and fifth groups were fed with basal diet supplemented with 0.1%, 0.2%, and 0.3% of dry yeast (S.C) respectively. The basal diet is supplemented with amino acids, minerals and vitamins to meet all requirements of broiler chicks according to (NCR, 1994).

Data were collected weekly for body weight and feed intake and weight gain and feed conversion ratio were calculated although the experiment period (43days).

At the end of experiment 12 birds randomly were taken from each treatment (one chick /replicate), fasted overnight, weighed and slaughtered to complete bleeding, followed by plucking the feathers manually. Giblets were removed (liver, abdominal fat, heart and head) and weighed.

Blood samples were taken for examination post vaccination of Infectious Bursal Disease (IBD) and Newcastle diseases, which was detected by ELISA technique (FAO, 1989) to determine antibodies titer.

Collected data were subjected to statistical analysis using [SPSS] version 11.5 software for one-way ANOVA test to determine the analysis of vaccine for study variables and Duncan's (1955) method was employed to separate between treatments. Furthermore, regression and correlation tests were used to quantify the relationship between the studied variables.

This study was conducted to evaluate the use of three levels of dry yeast (0.1, 0.2, and 0.3%), Neomycin and control groups of broiler on performance and immune responses. Hundred and five unsexed day – old Abercar strain broiler of average weight of 43 grams were subjected to 43 days experimental period. The chicks were distributed randomly into (5) groups with (3) replicates each with 7chicks. Treatments groups (A) represent control, (B) is Neomycin groups and 0.1%,0.2% and 0.3% dry yeast (Saccharomyces crevasse) represent groups (C, E, D) respectively.

Results showed that chicks fed by 0.3% dry yeast (s .c) had significantly ($P<0.05$) higher body weight gain (BWG) (2178 kg-2049.3 kg) and feed conversion ratio (FCR) (1.8) at end of experiment. There is no significant difference in feed intake (FI) among all treatments. The groups of chicks fed with 0.3% yeast compared to Neomycin, 0.1% and 0.2 % (s. c) groups had the lowest abdominal fat and high carcass yield. With respect to immune response chicks groups fed with yeast levels of (0.1%,0.2%,0.3%), results obtained regarding antibodies titer of vaccination, showed no significant difference among treatments groups after the use of (IBD-D78) vaccine but when yeast level of 0.3% is used there is a high antibodies titer difference between the treatments of neomycin and control group .With application of (0.1% 0.2% and 0.3%) yeast levels respectively, there is a high antibodies titer of vaccine (NDV) in both readings of (18days - 43days of age) of vaccination program. In conclusion, results of this study indicated that supplementary yeast of 0.3% level could improve performance values in body weight gain, feed conversion ratio and increase rate of carcass dressing. Likewise, the group treated by 0.03% yeast recorded highly titer antibodies at 18 days which indicate detection of solid immunity. It can be deduced from this study that ELISA can employ for diagnosis and detection of anti-body titer in vaccination program due its accuracy, sensitivity and urgency.

3. RESULTS AND DISCUSSION

The result showed that use of (S.C) at 0.3% level to the broiler significantly ($P<0.05$) increased the body weight, body weight gain and FCR as compared to all other treatments in table (1). Feed intake was found of no significant effect ($P>0.05$) in all treatments. This result agrees with that obtained by (Onifade, 1997; Mohammed *et al* ., 2012; ,Gheisari *et al* ., 2012) and disagree with Manal ,2012).

Table 1. Effect of using different Level of yeast [s.c] additive on performance value in broilers chick in compared with neomycin and control diets

Treatment	BW	FI	BWG	FCR
Control	1760.0	1633.6^{b}	3773.3^{a}	2.3^{a}
Neomycin	1751.7	1625.7^{b}	3840^{a}	2.4^{a}
0.1% yeast	1863.7^{b}	1733.7^{b}	3856.0a	2.2^{a}
0.2% yeast	1855.3^{b}	1719.3^{b}	3788.7^{a}	2.2^{a}
0.3% yeast	2178.0^{a}	2049.3^{a}	3786.3^{a}	1.8^{b}
SE	71.4	70.8	41.1	0.1
Sig.	*	*	NS	*

a,b Means within a column which having similar letter are not significantly different at 0.5 level of probability according to DNNRT.

Chicks fed with Dry yeast at 0.3% level had significantly higher ($P<0.05$) effect on carcass body weight gain as compared to all treatments (Table 2). As shown in table 2 application of 0.1% yeast (s.c) has significantly ($P < 0.05$) increased abdominal fat as compared to control and 0.3% level yeast groups. However, 0.1% and 0.2%

recorded similar results to neomycin and control in all performance.

Table 2. Effect of levels and neomycin yeast on carcass characteristics

Heart %	Bursa l%	Liver%	Abdominal fat %	Carcass %	Treatment
1.0b	0.05	1.8b	0.9b	73b	Control
1.7a	0.07	1.7b	1.1ab	73.1b	Neomycin
1.8a	0.05	2.0b	1.4a	73.3b	0.1%
1.1b	0.06	2.1a	1.2ab	73.3b	0.2%
1.2b	0.07	1.8a	0.7b	74.8a	0.3%
0.98	0.63	2.11	3.01	32.46	S.E±

a,b Means within a column which having similar letter are not significantly different at 0.5 level of probability according to DNNRT.

The effect of feeding different levels (0.1%, 0.2% and 0.3%) of dry yeast on antibodies titer against (IBD) and (ND) of broiler chicks at 18, 43 days of age, was calculated according to titer Log 10. The use of yeast (S.C) treatments had no significant effect (P>0.05) on antibody titer level against (IBD). However, at 18 days of age, chicks fed diet containing 0.3% dry yeast had a higher antibody titer (IBD) compared to chicks fed with diet containing neomycin and control groups. The use of S.C (dry yeast) had no significant effect (P>0.05) on antibodies titer against NDV at 18d and43d of age (P>0.05) but chicks fed with diet containing 0.3%dry yeast had a high antibody titer against NDV than control group. Furthermore, the addition of dry yeast S.C than control group and inclusion of 0.3%to diet than 0.1% and 0.2% elicited high serum antibodies titer against IBD and NDV. It seems that of dietary of dry yeast S.c could be an effective stimulator on humoral immune response in chickens. The ELISA test proved to be faster ,reliable and accurate for detection of antibodies in compare with others conventional methods of diagnostic technique and also ELISA test is more sensitive and can be used to detect the presence of antibodies, (Marquardt , et al., 1980).

Table 3. Detection of antibodies titer after vaccination of infectious Bursal disease vaccine in five treatments

Anti NDV $\log_{10}$ titer		Anti IBD $\log_{10}$ titer		Treatment
18d	43d	18d	43d	
3.54	3.22a	2.69	3.19a	Control
3.66	3.51a	3.09	3.25a	Neomycin
3.72	3.50a	2.93	3.55a	0.1% dry yeast
3.62	3.24a	3.13	3.27a	0.2% dry yeast
3.55	3.58a	2.86	3.45a	0.3% yeast
57.3	44.7a	8.28.8	1765	S.E

Means within a column which having similar letter are not significantly different at 0.5 level of probability according to DNNRT.

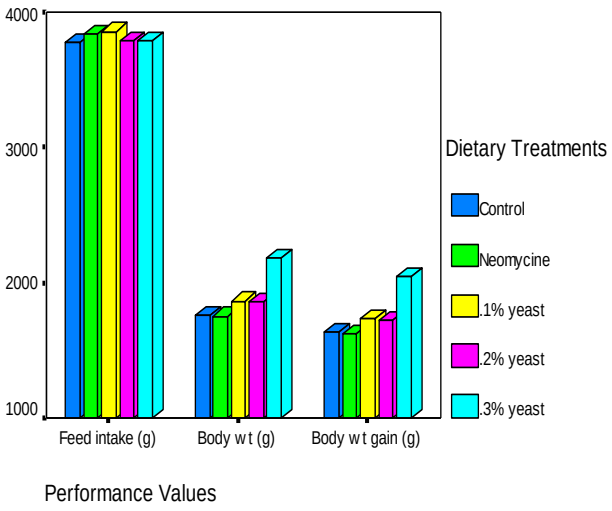

Figure 1. Effect of application of different levels of yeast and Neomycin on Performance of Broiler Chicks

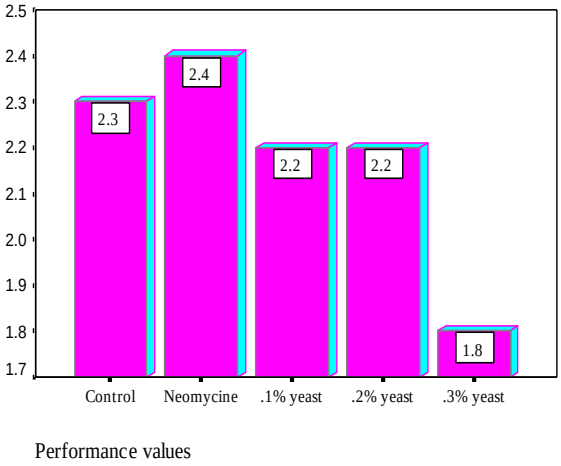

Figure 2. Level of feed convertion ratio as affected by different levels of yeast and Neomycin treatments

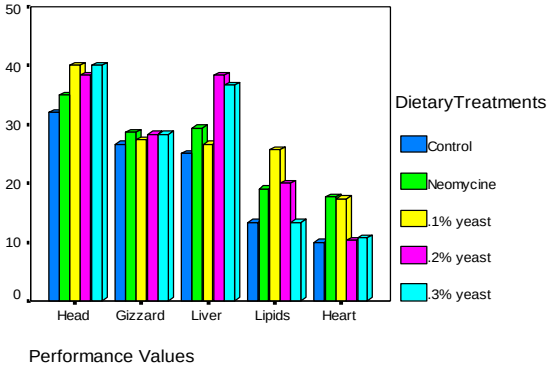

Figure 3. Non carcass components

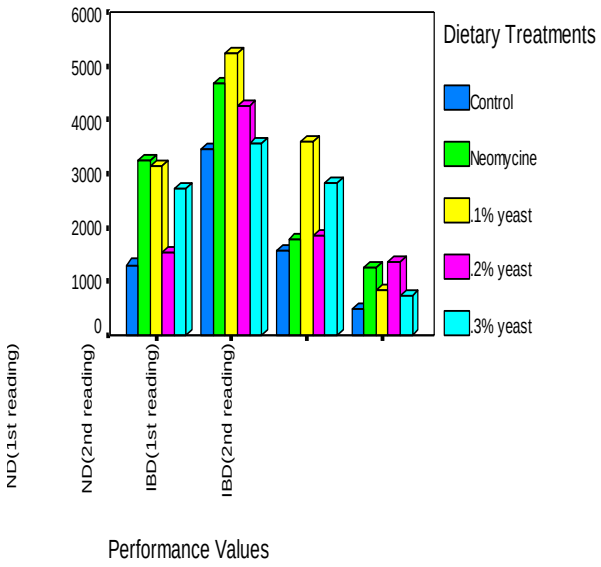

Figure 4. Detection of antibodies titer after vaccinaation of ND and IBD vaccine in five treatments

4. CONCLUSIONS

The obtained result of this study suggests that yeast as probiotic exerted beneficial effect on performance values of broilers chicks. Therefore this dry yeast as natural probiotic may be used as alternative to replace the adverse of side effect of antibiotic .Although using yeast in broiler supplementation can improve solid immunity to chicks after vaccination.

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