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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 10 (11): 1870-1874, 2007
ISSN 1028-8880

Carcass Weight, Growth Performance and Internal Organs Size of Broilers Fed Graded Levels of *Saccharomycese cervicia* Supplemented Diets

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Abstract: The effects of graded levels of *Saccharomyces cerviciae* (SC) on performance, carcass characteristic and internal organs size of broilers were investigated in a seven weeks trial using 160 days old Cab 500 mal broiler chicks fed corn-soybean meal based diet. In a completely randomized design 160 chicks distributed to four dietary treatments. Thus each dietary treatment had 4 replication with 10 birds each. Four dietary treatment according to the *Saccharomyces cervicia* (SC) levels were S (0),S_1(100), S_2 (300) and S_3 (500 g kg^{-1} diet). Each three levels of SC significantly ($p<0.05$) affected the Feed Conversion Rate (FCR), during 7-21 days and ` S_3 showed the best FCR but during 21-42 days the S_1 was the best ($p<0.05$).There was no significance differences in body weight gain (BW) and Feed Intake (FI) between the treatments. SC supplementation did not significantly ($p>0.05$) affect Dressing Yield (DY) but dressing yield in SC containing treatments numerically were higher than control. Inclusion and levels of SC significantly ($p<0.05$) affected, liver, spleen and Abdominal Fat (AF) weight. As the level of SC in diets increased the liver and spleen weight increased too. But abdominal fat decreased. Supplementation of SC significantly ($p<0.05$) affected the intestinal (Large and Small) length (LI, SI), the shortest intestine measured on S3 receiving diet, while the highest intestine measured on bird receiving the control diet. The results demonstrated that compared to control diet supplemental SC significantly ($p<0.05$) improve FCR, decrease abdominal fat, intestine length and apparently increase body weight gain, dressing yield, liver and spleen weights and 100 g kg^{-1} SC diet give the best.

Key words: Broiler, *Saccharomyces cervicia*, growth performance, internal organs

INTRODUCTION

Probiotics have been proven to be effective in broiler nutrition (Goodling *et al*., 1987) probiotics have a beneficial effect on the health and wellbeing of the host and improve intestinal microbial balance (Fuller, 1989). Direct fed probiotics benefit the host animal by stimulating appetite (Nahashon *et al*., 1993), produce the digestive enzyme (Saarela *et al*., 2000) effects on the weight and length of intestines (Celik *et al*., 2001 and Samual, 1995) and utilize indigestible carbohydrate (Prins, 1977). Moreover according to the finds of Nisbet *et al*. (1993) and Pascual *et al*. (1999) probiotics could protect broilers against pathogens by colonization in the gastrointestinal tract. Also Hayayed *et al*. (2004) reported that the probiotic diet resulted in the lowest abdominal fat% in broiler. Jernigan *et al*. (1985), Yeo and Kim (1997) and Kim and Kim (1992) reported that use of probiotic in broiler chicks diets significantly improve the daily body weight gain, feed intake and feed efficiency. Studies with broiler chicks were indicated a positive response to dietary supplementation of probiotic (Midilli and Tuncer, 2001). Feeding viable Lactobacillus at 1100 mg kg^{-1} in laying hen diets decreased intestinal length from 7-59 weeks of age (Nahashon, 1996). The addition of Lactobacillus acidophilus plus Lactobacillus casei mixed culture to maize-barley (50/50) diet improved hen day egg production, feed conversion ratio(Tortuero and Fernandez, 1995). In poultry industry, probiotic supplementation has been shown to improve body weight gain, feed conversion ratio/and mortality rate in broiler chickens (Kalbande *et al*., 1992). The strain of selected microorganisms, the dosage, method of preparation and condition of animals could be partially responsible for such description (Huang *et al*., 2004). The objects of this study were to evaluate the effect of graded levels of *Saccharomyces Cereviciae* on broiler performance, carcass weight and internal organs size.

MATERIAL AND METHODS

One hundred sixty seven day old male broiler chicks of uniform weights (Cobb 5000) distributed in 16 experimental deep litter pens (1.0×1.2 m). Birds were

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Table 1: Composition and calculated analysis of experimental diets

	Starter				Finisher			
Ingredient (%)	S	S1	S2	S3	S	S1	S2	S3
Corn	59.70	59.48	59.04	58.59	64.20	64.21	64.29	64.36
SBM (48)	35.67	35.71	35.80	35.88	28.81	26.72	26.76	26.87
SunF.Oile	1.21	1.29	1.45	1.61	1.00	1.00	1.00	1.00
DCP	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
L.Stone	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Vit.Pr.*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Min.Pr.**	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DL.Met.	0.14	0.14	0.14	0.14	0.06	0.06	0.06	0.06
L.Lysin	-	-	-	-	0.07	0.07	0.07	0.07
S.C.	_	0.1	0.3	0.	-	0.10	0.30	0.50
Weat bran	_	_	_	_	5.00	5.00	5-00	5.00
Salt	0.42	0.42	0.42	0.42	0.30	0.30	0.30	0.30
Calculate Nutrient Composition								
M.E.Kcal/kg	2900				2900			
C.P.	20.85				18.13			
Arji	1.13				1.00			
Lysin	0.99				0.91			
Metio.	0.45				0.35			
Met+sys	0.81				0.65			
Ca	0.82				0.72			
Av.P.	0.41				0.36			

*Supplied per kilogram of diet: vitamin A (retinyl acetate+ terinyl palmitate), 11000 IU; vitamin D, 22000 IU; vitamin E, 30 IU; menadione, 2.0 methylamine, 1.5 mg mg; riboflavin, 6.0 mg; niacin, 60.0 mg; pyridoxine, 4.0 mg; vitamin B12, 0.02 mg; pantothenic acid, 10.0 mg; folic acid, 0.6 mg. biotin, **supplied P kg of diet 0.15 mg; iron, 80.0 mg; Zinc, 80.0 mg; manganese, 80.0 mg; copper, 10.0 mg; iodine, 0.8 mg and selenium, 0.3 mg. c-Dicalcium phosphate 220 g kg^{-1} Ca and 187 g kg^{-1} P. d-Natuphos was added at the levels of 0.0, 0.3,0.6 and 0.9 g kg^{-1} to provide 0.0, 300,600 and 9000 FTU kg^{-1} of phytase, respectively to Grover and finisher diets

housed in an environmentally controlled broiler house with concert floor covered with wheat straw. The temperature of the room was maintained at 33°C initially and reduced by 3°C/week until reached 21°C, at which the room temperature was maintained for the end of experiment. Artificial lighting was set to provide 24 h of light day. The experimental design was completely randomized with four treatments. Each treatment was replicated four times and each experimental pen consisted of 10 chicks. All birds were fed a standard commercial diet based on corn and soybean meal (not shown) during the first seven day of life and then each treatment switched to their respective experimental diets. Feed and water were available ad libitum.

Diets (Starter and finisher) were formulated to meet or exceed requirements by the National Research Council (1994), in mash form and were fed from days 7-42. The composition of the diets is shown in Table 1. To the basal diet *Saccharomyces cerviciae* was added 0.0, 1, 3 and 5 g kg^{-1}. Special care was taken for proper mixing of enzyme in experimental diets. Birds were observed three times daily to assess general condition and mortality was recorded immediately upon observation. Feed to body weight ratios was corrected for mortality. Body weight gain, feed consumption of all chicks from all pens was measured weekly. At 42 days of age, 2 birds from each replicate weighing average of pen weight were selected. Final body weights were determined, slaughtered and eviscerated in order to determine, carcass weight (dressing yield) as a percentage of live weight, gizzard weight, abdominal fat pad, liver, spleen and pancreas as a percentage of carcass weight and intestinal length. Dressing percentage was determined using carcass weight as a proportion of body weight. Carcass weight measurements were done after defeathering and removal of feet, head and viscera. The intestine and saeca were carefully removed and the length of different part was recorded without mechanical distension. Dressing percentage was calculated by dividing the carcass weight by the live body weight. All data (pen means) were analyzed using the general linear model procedure of SAS Software (1999). Treatment differences obtained upon statistical analyses were compared using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

During 7-21 days of experimental period the body weight gain of broilers was not statistically significantly ($p>0.05$) influenced by the levels of SC (Table 2). At the same time it was higher than in the control. This result is in agreement with the finds of Celike *et al.* (2001) who reported the Body weight gain of broiler chickens during the first 21 days of experimental was not significantly effected by 0.2% Saccharomycese Cervicia containing commercial broiler diet. Kumprechtova *et al.* (2000) reported, the live weight of broilers at 21 days of age was not statistically significant influenced by the levels of the

Table 2: Effects of different levels of *Saccharomyces cervicia* on performance, carcass yield and internal organs size of broiler

Parameters	Age	S	S1	S2	S3
Bw (G/Bird)	21	665.75±6.39	677.750±5.63	677.750±1.53	681.620±4.90
	42	1998.50±14.72	2048.370±19.62	204`.750±1596	2039.170±17.26
FI (G/Bird)	21	781.10±0.00	770.600±0.00	764.600±0.00	762.500±0.01
	42	2732.00±0.03a	2671.200±0.02b	2742.600±0.01a	2740.500±00a
FCR	21	1.46±0.02a	1.420±0.02	1.410±0.01	1.420±0.05
	42	1.86±0.01a	1.770±0.01b	1.830±0.02a	1.830±0.02a
CW[1]	42	1532.87±198.8b	1667.320±178.80a	1658.310±200b	1603.440±213.56ab
CY (%)[2]	42	76.69±0.93a	81.390±0.97	81.220±0.34b	78.680±0.17ab
BY (%)[3]	42	28.84±0.47b	30.510±0.15a	30.320±0.24a	30.900±0.90a
LW (%)[4]	42	0.291±0.01a	0.296±0.02a	0.291±0.01a	0.310±0.01b
SW (%)[5]	42	0.12±0.01b	0.149±0.00a	0.151±0.00a	0.154±0.01a
AF (%)[6]	42	1.99±0.73a	1.590±0.41b	1.745±0.03b	1.820±0.07ab
SIL (cm)[7]	42	174.31±3.82a	165.580±3.24ab	163.550±2.77b	169.620±2.14ab
LIL (cm)[8]	42	11.67±0.65a	10.260±0.65a	9.900±0.38b	10.410±0.22ab

[a,b] Means with the same row with different superscripts are significantly different ($p<0.05$). [1]Carcass weight, [2]Carcass yield [3]Breast meat yield, [4]Liver weight, [5]Spleen weight, [6]Abdominal weight, [7]Smal intestinal length and [8]Larg intestinal length

probiotic, but positive effects of 100 g probiotic/100 kg feed and 200 g of probiotic/100 kg feeds were observed in cockerels receiving with a different lower level crud protein diets. In this phase, the feed efficiency of broilers significantly ($p<0.05$) influenced by the levels of the SC. Among of the 3 levels, 3 g kg^{-1} SC was the best followed by 1 and 5 g kg^{-1}. This result is not in agreement with the founds of Celike *et al.* (2001). In this phase, comparing with control, reduction feed intake of three levels of SC was observed in broilers receiving SC containing diets, but the differences was not statistically significant ($p>0.05$), as the level of SC increased the feed intake decreased.

During 21-42 days only 1 g kg^{-1} SC containing diet statistically significant ($p<0.05$) reduced feed intake ($p<0.05$). The broilers receiving the 1 g kg^{-1} diet ate the lowest and the other both levels of SC containing diets ate the same as control. This result is in agreement with finds of Yeo and Kim (1997) that observed significant improvements in daily body weight and feed consumption for broiler chicks fed probiotic. Samuel (1995) observed an increased daily feed consumption, nitrogen and calcium retention and decreased intestinal lengths in single comb white leghorn fed a diet supplemented with a live microbial during the growth and egg laying phases. Nahashon *et al.* (1993) reported that direct fed probiotics benefit the host animal by stimulating appetite. The findings of this study are in contrast with suggestion of Samuel (1995) and Nahshon *et al.* (1993).

Inclusion of SC did not statistically significantly effect ($p>0.05$) on body weight gain, but in comparing with control SC containing diets improved body weight gain numerically. Among three levels of SC treatments 1 g kg^{-1} had the highest body weight. Watkins and Kratzer (1984) studies on the effects of incorporating probiotics in the diets of broilers reported improvements in growth and reduction of fed conversion index in the 1 to 28, 1 to 35 and 1-49 days phase in growth experiment. Barrow (1992) has reported that probiotics for chickens are designed either to replace beneficial organisms that are not present in the alimentary tract or to provide the chicken with the effects of beneficial bacteria. By similar way the microbial flora of the alimentary tract was supported by SC and found a significant increase ($p<0.05$) in body weight gain. This was observed in birds at 37 th day.

In feed efficiency like feed intake only the 1 g kg^{-1} SC containing diets statistically significantly ($p<0.05$) improved feed conversion rate. Addition of graded levels (0, 400, 1000 and 2000 g Biopus 2B ton^{-1}) to Laying hen diets has no significant effect on feed intake and feed efficiency (Mahdavi *et al.*, 2005). These results confirm the findings of Watkins and Kratzer (1984) and Barrow (1992), but are in contrast with finds of Mahdavi *et al.* (2005). One of the most important ways in which a probiotic organism may exert a beneficial effect on his host is to modify the metabolic processes, particularly those occurring in the gut. The positive influence of SC on FCR and FI observed in this experiment may be related to increasing of available nutrients, mineral absorption, intestinal microbial balance improving,gastric function, nitrogen retention and carbohydrate metabolism (Kalbande *et al.*, 1992; Toms and Powrie, 2001; fuller, 1989). So birds fulfill their nutrient requirements by taking less amount of feed.

Carcass weight: The carcass weight of broilers at 42 days of age was statistically significantly influenced ($p<0.05$) by SC. Positive effect of each three levels of SC were observed in broilers receiving SC containing diets. Among of three levels, 1 g kg^{-1} was the highest followed by 3 and 5 g kg^{-1}. This result is in contrast with the finds of Denli *et al.* (2003) who reported that carcass yield and liver weight were not affected by probiotic ($p>0.05$).

Dressing yield: In comparing with control inclusion, SC significantly effected ($p<0.05$) dressing yield. The 1 g kg^{-1} SC showed the highest followed by 3 and 5 g kg^{-1}. This

result is in contrast with the finds of Tamilvanan *et al.* (2003) who reported Probiotics had not much influenced the carcass yield of broiler chicken ($p<0.050$).

Breast meat yield: Similar to carcass weight SC significantly effected ($p<0.05$) breast meat yield. As well as carcass weight and yield the broilers fed SC containing diets produced higher breast meat. Studies with broiler chicks by Mohan *et al.* (1996) reported that addition of probiotics had not influenced carcass characters. Similar result was observed by Tamilvanan *et al.* (2003). These finds are not in agreement with results of in this study.

Abdominal fat: The abdominal fat of broilers at 42 days of age also affected by SC. There were significant differences between SC containing treatments and control ($p<0.05$). The probiotic diets resulted in the low fat, while the highest abdominal fat measured on birds receiving the control diet altogether inclusion of probiotic in experimental poultry diets in this study reduced abdominal fat, but as the probiotic levels increased in the diets, the fat level increased. That is because of the increasing of availability of nutrients, improvements of carbohydrate metabolism and absorption of nutrients. Prins (1977) reported probiotics increase the digestibility of carbohydrate so available energy increases.

Intestinal length: The intestinal length of broilers at 42 days were statistically significantly influenced ($p<0.05$) by the levels of SC. Although the level effects of SC were not constant. In comparing with control the diet with 3 g kg^{-1}. SC showed the shortest and followed by 1 and 5 g kg^{-1}. This results are in contrast with Denil *et al.*, 2003) who found that probiotics did not affect significantly ($p>0.05$) the intestinal length of broilers at 42 days. Shorter intestine in probiotic containing treatments were caused by improvement of feed efficiency, increasing of available nutrients, the rate of feed digestion and absorption.

In comparing with control dietary, SC affected liver and speelen weight ($p<0.05$) as SC levels increased in treatments, these organs weight increased. Among of three levels of SC 5 g kg^{-1} was the highest followed by 3 and 1 g kg^{-1}. But the level effects of SC on liver weight were not constant like spleen. The highest weight belongs to the 5 g kg^{-1} SC followed by 1 and 3 g kg^{-1} diets.

Judging by performance indicators, feed efficiency, body weight gain and carcass weight and composition were improved by the lowest level (1 g kg^{-1} diet) of SC than the higher does for all performance parameters. It demonstrates that in the condition of this study the 1 g kg^{-1} of SC in diet is appropriate dose for broiler chick's performance, Carcass weigh and, dressing yield.

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