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Impact of Different Dietary Supplementation with (Y-MOS) Yeast on Performance and Carcass Characteristics of Broiler Chickens

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Abstract

An experiment was conducted to evaluate the impact of different levels of commercial Y-MOS yeast on performance, carcass characteristics and meat quality of broiler chickens. The Complete Randomized Design was used. A total of 300, unsexed one- day old (Ross 308) broiler chicks were randomly divided into four dietary treatments. The treatments contain 0, 1.0, 1.5 and 2 kg Y-MOS/ton of feed. Each treatment was sub-divided into three replicates; with each having 25 experimental birds. All diets were formulated according to (NRC) to meet the nutrient requirements of the broiler chickens. The results showed that all parameters values of performance (body weight, feed intake, body weight gain and feed conversion ratio) were not affected significantly (P>0.05) by the Y-MOS yeast supplementation to diets fed to broiler chickens throughout the experimental period. The results revealed that there were no significant (P>0.05) differences in dressed carcass, muscle: bone ratio, commercial sale cuts (breast, thigh, drumstick and wing) and none-carcass components among treatment groups of broiler chickens. However, results showed that there was significant (P<0.05) differences among all treatment groups in chemical composition and physical properties of broiler breast meat.

Keywords: *Broiler, Performance, Carcass characteristics, Y-MOS yeast.*

1. Introduction

Antibiotics have been used for over fifty years in animal production and give positive responses in growth promotion and overall animal health [1, 2]. However, there has been a recent increase in public concern about the use of antibiotic growth promoters due to antibiotic-resistant bacteria and the decreased effectiveness of antibiotics used for humans [3], so alternatives to antibiotics are of great interest to the poultry industry. There are several possible alternatives to the use of antibiotics in animal feed, including: probiotics, prebiotics, organic acids, and plant extracts [4, 5]. Mannan oligosaccharides are commonly used in the same manner as prebiotics with the exception of selectively enriching for beneficial bacterial populations [2]. Mannose is capable of inhibiting pathogenic bacteria [6]. Y-MOS is a natural extract from natural yeast compound of β-glucanase18% and mannanoligosaccharides (M.O.S) 27% produced by the Nutrex Ltd in Belgium, also has immunomodulatory properties [7].

The current study was conducted to identify the impact of different dietary levels of Y-MOS on broiler performance and carcass characteristics.

2. Materials and Methods

2.1 Study Area

This experiment was carried out at the poultry production farm unit, College of Animal Production, University of Bahri, Khartoum North, Kadaru area during the period from 10th January 2016 to 13th February 2016 in standard management conditions (closed system) in which temperature provided weekly was 28cº and 34 cº minimum and maximum, respectively. The duration of the experiment was five weeks. Complete Randomized Design was used in the experiment.

2.2. Birds and Housing

Three hundred unsexed one-day- old Ross 308 broiler chicks were purchased from a commercial hatchery (Inmaa for poultry Production Company, Omdurman-

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Sudan).The average of chick's initial weight was 40 g. The first week of chick's age considered as adaptation period, then used for the experiment. During the first three days, the chicks were administered to multi-vitamins AD3E + colistin 0.2ml/1L in the drinking water, the chicks were fed on pre-starter (pellets) at the rate of a100g. per chick in the first week (Table 1), then starter feed mash at the rate of 1.25 kg. per chick and finisher feed mash for the rest period (Table 2 and 3). Water and the feed were freely provided. Chicks were vaccinated against Newcastle disease at one- day old (spraying) and repeated at 21days of age (in drinking water). Also vaccinated against Gambaro disease at 12 days of age and repeated at 19 days old. Soluble multi-vitamins were given to the chicks before and after three days of the vaccination to guard against stress. The chicks were randomly distributed to four dietary treatments and with each carrying 75 experimental birds A, B, C and D respectively. Further, the treatments were subdivided into three replicates in every 25 experimental birds.

The experimental chicks were kept in an open experimental wire mesh pen which was constructed on the concrete floor (1.5 m^2) inside the poultry house. Partitioning of the pens was done by using the wire mesh. Each pen was supplied with nipples line of drinking water and 2 feeders (5Kg) which were cleaned and disinfected before feeding started. The feeders and water lines heights were adjusted, according to the progressive growth of the chicks.

Table 1 Analytical composition of broiler pre-starter feed (pellets)

Ingredients	Percentage (%)
Crude Protein	23.00
Crude Fiber	2.59
Crude Fat	6.50
Crude Ash Sodium	6.00
Methionine	0.63
Methionine+cysteine	1.00
Lysine	1.40
Calcium	1.00
Tryptophan	0.25
Threonine	0.93
Phosphorus tot.	0.60
Phosphorus av.	0.50
Sodium	0.16

2.3 Experimental Broiler Diets

All the experimental diets (A, B, C and D) were formulated to be iso- nitrogenous (22.5% CP) and iso-caloric (3100 Kcal/Kg) to meet the nutrient requirements of broiler according to NRC,[8]. Diets were formulated from local ingredients except for the imported super concentrate as follows**:**

Treatment A (basal diet) considered as a control without Y-MOS.

Treatment B (basal diet supplemented with 1000 g Y-MOS/ton.

Treatment C (basal diet supplemented with 1500 g Y-MOS/ton.

Treatment D (basal diet supplemented with 2000 g Y-MOS/ton.

Table 2 The ingredients composition of broiler starter feed (mash)

Ingredients%	Treatments			
	(control) A	Y-MOS (0.1%) B	Y-MOS (0.15%) C	Y-MOS (0.2%) D
Sorghum	70	70	70	70
Groundnut	21.5	21.5	21.5	21.5
Super concentrate*	5.0	5.0	5.0	5.0
Wheat bran	2.0	1.5	1.55	1.0
Lime stone	1.0	1.1	1.0	1.1
Salt	0.2	0.2	0.2	0.2
Lysine	0.2	0.1	0.1	0.5
Methionine	0.1	0.5	0.5	0.5
Y-MOS	0	0.1	0.15	0.2

Table 3 The ingredients composition of broiler finisher feed (mash)

Ingredients%	Treatments			
	(control) A	Y-MOS (0.1%) B	Y-MOS (0.15%) C	Y-MOS (0.2%) D
Sorghum	75	75	75	75
Groundnut	16.5	16.5	16.5	16.5
Super concentrate*	5.0	5.0	5.0	5.0
Wheat bran	2.0	2.0	1.95	1.9
Lime stone	1.0	1.0	1.0	1.0
Salt	0.2	0.2	0.2	0.2
Lysine	0.2	0.1	0.1	0.1
Methionine	0.1	0.1	0.1	0.1
Y-MOS	0	0.1	0.15	0.2

Composition of supper concentrate:

Crude protein35.00, crude fat2.00, sodium2.70, calcium3.00, phosphorus available4.60, lysine11.50, methionine4.50, methionine+cyst.4.90. Vit. A 250.000 IU/kg, Vit D3 50.000IU/kg, Vit. E 625.00, Vit. B1/Thiamine 37.50 mg/kg, Manganese 1.500.00 mg/kg, Zinc1.250.00 mg/kg, Iron1.000.00 mg/kg, Vit.B2/Riboflavin 125.00mg/kg, Vit.B3/Niacin750.00 mg/kg, Vit.B5/Pantothenic acid250.00 mg/kg, Iodine10.00 mg/kg, Vit. B6/Pyridoxine 50.00 mg/kg, Selenium 3.75 mg/kg, Vit. B9/Folic acid25.00 mg/kg, Vit. B12 625.00 Mcg/kg, Vitamin K3 50.00 mg/kg, Biotin 1.000.00 Mcg/kg, .Choline chloride7.000.00 mg/kg., 6 Phytase FTU/kg30.000.00.

ME (Kcal/KG) =2000.00.

2.4 Data Collection and analysis

2.4.1 Performance data and slaughter Procedures

Feed intake, average weight gain and body weight for all groups were determined and recorded weekly throughout the experimental period. At the end of a 5th week, the experimental birds have fasted overnight with only water allowed. Birds were weighted individually before slaughter by severing the right and left carotid and jugular vessels, trachea and the esophagus. After bleeding they were scalded in hot mixed with salt water, hand-plucked and washed. The head was removed close

to skull and feet and shanks. Evisceration was accomplished by a posterior ventral cut to completely remove the visceral organs. Five birds from each dietary treatment were randomly taken to determine the following**:**

a- Dressing % **(**dressed carcass was weighed and the dressing percentage was obtained by expressing the dressed carcass weight as a percentage of live body weight).

b- Commercial carcass cuts% (prepared from the hot carcass by dividing the carcass into right and left sides by mid sawing along the vertebral column, then the left side was divided into commercial cuts; breast, drumstick, thigh and wing. Each cut was weighted separately and deboned).

c- Chemical and physical analysis (the produced meat was frozen and stored for chemical analysis (moisture, crude protein, fat and ash contents according to the AOAC [9], and physical analysis {WHC% and pH}).The 5 samples were stored for 24 hours in a blast freezer and analyzed at Food Research Centre Laboratories-Shambat, Sudan.

2.4.2 Statistical Analysis

The results were subjected to statistical analysis using one- way analysis of variance (ANOVA), by using the PROC MIXED of SAS [10]. Means were compared with Duncan's Multiple Range Test (at 5% level of probability)

3. Results and Discussion

3.1 Performance

The weekly body weight, feed intake and feed conversion ratio of the experimental broiler chicks fed on diets supplemented with different levels of commercial Y-MOS yeast are presented in (Table 4). Results showed that there were no significant (P>0.05) difference between treatment groups. However, chicks in group C had the highest values compared with other treatment groups, the overall main effect of Y-MOS yeast was to increase weight gain when compared to control group. This corroborated with the findings of Mohamed S. and Mukhtar A. [11] who reported that addition of Y-MOS improved the performance of broiler chickens, but the differences among treatment groups were not significant.

Table 4 Effect of feed supplemented with different levels of Y-MOS on performance of broiler chicks

Parameter	Treatments				±SE	L.S
	Control A	Y-MOS (0.1%) B	Y-MOS (0.15%) C	Y-MOS (0.2%) D		
Body weight (g)	677.17	645.75	734.17	722.75	95.48	N.S
Feed intake (g)	91.64	83.58	92.66	85.79	9.24	N.S
Daily body weight gain (g)	36.37	30.70	39.04	35.23	4.78	N.S
Feed conversion ratio	1.05	1.10	1.14	1.25	0.11	N.S

In this table and in subsequent tables:
L.S = Level of Significance.
±SE= ±Standard error.
N.S = Not significant (p>0.05).
** = Significant (p< 0.05).*

Table 5: Effect of feed supplemented with different levels of Y-MOS on carcass characteristics, wholesale cuts and non-carcass components in broiler chickens

Parameters	Treatments				±SE	L.S
	Control A	Y-MOS (0.1%) B	Y-MOS (0.15%) C	Y-MOS (0.2%) D		
Dressed carcass/g	814.40	846.20	844.00	886.20	67.37	N.S
Dressing%	76.54^{ab}	82.33^{a}	62.32^{b}	62.16^{b}	4.32	*
Commercial sale cut (g)						
Breast	279.62	284.60	281.11	305.01	24.72	N.S
Thigh	66.92	67.97	66.32	73.34	5.77	N.S
Drumstick	61.91	65.27	55.63	65.47	5.75	N.S
Wing	52.69	53.90	41.14	56.08	4.16	N.S
Meat: bone ratio						
Breast	4.47	4.04	4.29	3.63	0.40	N.S
Drumstick	2.89	2.48	2.61	2.95	0.29	N.S
Thigh	4.18	3.91	4.12	3.88	0.31	N.S
None-carcass components (%)						
Gizzard	4.06	3.66	3.68	3.93	0.24	N.S
Liver	4.87	4.30	4.24	3.68	0.39	N.S
Heart	1.05	1.00	1.12	0.97	0.06	N.S

3.2 Carcass Characteristics

Table 5 shows the effect of feed supplemented with different levels of Y-MOS on carcass characteristics, wholesale cuts and non-carcass components in broiler chickens. The results explained that there were no significant differences (P>0.05) in the parameters measured except the percentage of dressed carcass, which was higher (P<0.05) in diet B compared to other treatments. These results agreed with those of [12,13,11who stated that MOS supplementation to broiler diets had no significant effect on carcass traits. In this study, results showed that MOS supplementation did not affect empty gizzard weight of birds; this result is inconsistent with that reported by Bozkurt [14].The results of this experiment also indicated that internal organ weights and proportions, as percentages of carcass weight, were not influenced by dietary MOS. These results agreed with those observed by Mohamed and Mukhtar [11]and [15] in contrast, Yang [16]who mentioned that dietary MOS supplementation decreased intestine and liver weight in broilers.

3.3 Physiochemical Composition of Broiler Breast Meat

As seen in (Table 6) the results indicated that addition of different levels of Y-MOS in broiler feed significantly (p< 0.05) affect the physiochemical characteristics of broiler breast meat in all parameters measured (moisture, crude protein, fat, ash, PH and WHC). The breast meat of chicks fed on a diet supplemented with 1.5 kg of Y-MOS recorded high significant value of moisture compared to that in control groups. Chicks fed on a diet supplemented with 2.00 kg of Y-MOS obtained high value in crude protein, fat, ash and WHC compared with all other experiment chicks groups. Paryad and Mahmoudi [17] stated that there are trials showing that enrichment of diets with yeast could favorably improve the quality of edible meat from broilers. For example, edible meat from broiler chicks fed a diet containing chromium-enriched yeast (Saccharomyces cerevisiae) exhibited increased tenderness [18] and increased water holding capacity [19]. Recently [11] mentioned that no data are available in the literature that is pertinent to the effect of yeast Y-MOS on subjective meat quality of broiler meat.

Table 6: Effect of feed supplemented with different levels of Y-MOS on physiochemical composition of broiler breast meat

Parameters	Treatments				±SE	L.S
	Control A	Y-MOS (0.1%) B	Y-MOS (0.15%) C	Y-MOS (0.2%) D		
Moisture%	68.79^{c}	68.95^{bc}	69.29^{a}	69.25^{ab}	0.09	*
Crude Protein%	22.40^{b}	22.41^{b}	22.45^{b}	22.73^{a}	0.07	*
Fat%	5.22^{b}	5.27^{ab}	5.31^{ab}	5.33^{a}	0.02	*
Ash%	1.23^{b}	1.25^{b}	1.34^{a}	1.40^{a}	0.02	*
pH	5.35^{a}	5.35^{a}	5.30^{b}	5.22^{c}	0.01	*
WHC	1.43^{c}	1.50^{b}	1.50^{b}	1.56^{a}	0.01	*

Conclusions

The addition of Y-MOS yeast up to 2% in broiler diets had no significant effect on performance and carcass yields of broiler chicks. However, a higher dose of Y-MOS significantly influences the chemical and physical analysis of the meat.

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