RESPONSE OF BROILER CHICKS TO DIETARY MORINGA SEEDS AND ZIGBIR AS NATURAL GROWTH PROMOTERS

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Abstract- In a 42-day experiment the effect of moringa seeds and Zigbir on growth performance and carcass characteristics was studied. One hundred twenty, 1day-old, unsexed Ross 308 broilers were purchased from commercial hatchery. The initial live body weight of the chick was (47.00 g ±0.67). The chicks were randomly assigned to 4 dietary treatments containing 3 replicates of 10 birds each. Starter and finisher experimental diets consisted of control, 0.04% zigbir, 0.5% undecorticated moringa seeds UDCM and 0.5% decorticated moringa seeds DCM. Data were analyzed in completely randomized design using the general linear model (GLM) procedure. Feed intake, body weight gain, FCR and PER were not significantly ($P \geq 0.05$) influenced by dietary treatments except feed intake during starter phase. Dietary moringa seeds both decorticated or undecorticated significantly ($P \leq 0.05$) reduced feed intake during starter phase compared to control and zigbir supplemented groups. However, DCM seeds improved overall body weight gain by 5.58, 5.78 and 10.43%, when compared to control, Zigbir and UDCM seeds group, respectively. During all growth phases, the performance of birds fed dietary zigbir was not significantly ($P \geq 0.05$) different versus control. On the other hand relative weight of breast was significantly ($P \leq 0.05$) higher for birds fed DCM seeds compared to the others. It was concluded that supplementation of DCM seeds improved growth performance of the broilers.

Keywords- Decorticated moringa, Zigbir, Broiler performance, Carcass.

I. INTRODUCTION

Antibiotic growth promoters (AGP) have been used as poultry feed additive to enhance gut health, control sub-clinical diseases and improving of the growth performance of poultry such as increasing body weight gain and improving feed conversion ratios [1] and [2]. With increasing controversy regarding bacterial resistance to antibiotics, the use of antibiotics in therapeutic or sub-therapeutic doses in poultry feed has been severely limited or eliminated in many countries [3]. Therefore, alternatives to AGP need to be proposed in order to maintain animal health, productivity and carcass quality. Such new group of additives is called 'Natural growth promoters' (NGP). These substances are also used in conventional agriculture to replace antibacterial growth promoters. NGPs often contain herbs that have long been used in natural medicine and organic agriculture [4]. Examples of these (NGP) are moringa and zigbir. Moringa is a potential plant that could be used to enhance immune responses and to improve intestinal health of broiler chicken. [5] assured that Moringa oleifera and Moringa stenopetala methanol and n-hexane seed extracts have inhibition effect on Salmonella typhii, Vibrio cholerae and Escherichia coli, which normally cause water borne diseases. Hence, Moringa has a great potential in improving nutrition and strengthening immune functions of broiler chicken [6]. Regarding chemical composition, [7] reported that Moringa oleifera seeds are good source of fats, proteins and minerals. On the other hand, zigbir is a feed additive of phytochemical activities with growth promoting characteristics. Andrographis paniculata, Solanum nigrum, Phylanthus niruni and Boerhavia diffusa are the four herbal plants that used in the preparation of Zigbir. It has been shown that these herbs have beneficial effect on liver health and productivity of animals [8] Thus, the present study was conducted to investigate the effects of zigbir, undecorticated moringa seeds and decorticated moringa seeds on growth performance and carcass characteristics of broiler chicks.

II. MATERIALS AND METHODS

A. The Site and Eexperimental Birds

This experiment was conducted at the poultry unit (open-house system) of Faculty of Agricultural Technology and Fish Sciences, University of Elneelain, Jebal-Awlia, Khartoum south. One hundred twenty, 1day-old, unsexed broilers (Ross 308) were randomly distributed among 12 floor pens (1m2 each) with wood shavings. The initial live body weight was (47.00 g ±0.67).

B. Experimental Diets

There were 4 dietary treatments, each consisting of 3 replicates with 10 birds per pen. The 4 treatments consisted of control, 0.04% zigbir, 0.5% undecorticated moringa UDCM seeds and 0.5% decorticated moringa DCM seeds. Four isocaloric and isonitrogenous starter and finisher diets were formulated according to nutrient specifications recommended by national research council [9]. Presatrter diet was provided for the first 5 days. Then the chicks were fed on starter diets till weak 3 then after they were allocated to finisher diets. The composition of starter and finisher diets is shown in Tables 1 and 2, respectively.

C. Management

Each pen was equipped with 1 metallic drinker and 1 metallic tubular feeder. Feed and water were provided

ad libitum. Drinkers and feeders were kept clean and leveled using red brick, cuboids. The lighting schedule consisted of continuous lighting throughout the experimental period by a combination of natural and artificial light. Artificial light was (12 hours) provided by incandescent bulb lamps of 60 watts. The bulbs were hanged about one foot height from the floor during the first two weeks and then maintained to about 6 feet. Before allocation of chicks, the house was carefully cleaned and disinfected. The birds received mix vaccine (IB+ Newcastle clone) at 6 days of age, and infections bursal disease (Gumboro) vaccine at 2 weeks of age, and replicated at 4 weeks of age.

D. Experimental procedure

Weekly feed intake and live body weight were determined for each pen. Feed conversion ratio (FCR) was calculated as feed intake per weight gain. While protein efficiency ratio (PER) was calculated as weight gain per protein consumed. Mortality was recorded daily as it occurred. At the end of the experiment (6 weeks of age), the birds were fasted from feed for an overnight and then weighed. After fasting, 2 birds from each pen were randomly selected, manually slaughtered and carcass characteristics parameters were determined.

E. Statistical analyses

Data were statistically evaluated by the general linear model (GLM) procedure of SAS [10] using complete randomized design. Moreover, Duncan's multiple range tests [11] was used to separate the treatment means with significant differences.

III. RESULTS AND DISCUSSION

The effects of zigbir, undecorticated moringa UDCM seeds and decorticated moringa DCM seeds on feed intake, body weight gain, FCR and PER during starter, finisher and overall period are presented in Table 3. Live performance parameters were not significantly ($P \geq 0.05$) influenced by dietary treatments except feed intake during starter phase.

Dietary moringa both decorticated or undecorticated significantly ($P \leq 0.05$) reduced feed intake during starter phase compared to control and zigbir supplemented group. On the other hand overall feed intake numerically increased for birds fed UDCM. This result agreed with the finding of [12] who due this to high palatability of moringa. However, body weight gain, FCR and PER for birds fed on DCM were improved during all phases when compared to control and those fed zigbir and UDCM supplemented diets. For instance DCM improved overall body weight gain by 5.58, 5.78 and 10.43%, when compared to control, Zigbir and UDCM group, respectively. This agreed with [2] who reported that the body weight gains of chicks were increased with the increasing percentages of moringa powder during the finisher and total periods. During all growth phases, the performance of birds fed dietary zigbir was not significantly ($P \geq 0.05$) different versus control. In contrast, the broiler chickens fed on diets containing Zigbir recorded the lowest FCR during total period and the highest body weight gain during finisher period [2]. Table 4. and Table 5. Show the effect of dietary treatments on carcass characteristics and internal organs. No significant ($P \geq 0.05$) effects of dietary treatments were observed on carcass yield and internal organs except absolute weight of breast, relative weight of breast, meat bone ratio of breast and length of intestine. These finding are inconsistent with the data reported by [13] and [14].This might be due to differences in inclusion rates of moringa and Zigbir. Relative weight of breast was significantly ($P \leq 0.05$) higher for birds fed DCM compared to the others. Likewise birds on DCM expressed significantly ($P \leq 0.05$) higher length of intestine. Similarly, [12] indicated that moringa is a potential plant that could be used to enhance immune responses and to improve intestinal health and nutrition of broiler chicken.

CONCLUSION

DCM seeds could be used as a natural growth promoter without any detrimental effects.

TABLE I. **COMPOSITION OF BROILER STARTER DIETS CONTAINING ZIGBIR, UNDECORTICATED MORINGA UDCM AND DECORTICATED MORINGA DCM.**

Dietary Treatments				
Ingredients, %	*Control (A)*	*Zigbir (B)*	*UDCM (C)*	*DCM (D)*
Sorghum	60.80	60.80	61.00	61.00
Sesame cake	8.00	8.00	8.00	8.00
groundnut cake	21.00	21.06	20.50	20.50
Wheat bran	0.50	0.40	0.40	0.40
Super concentrates*	5.00	5.00	5.00	5.00
Lime stone	0.80	0.80	0.80	0.80
D. phosphate	0.50	0.50	0.50	0.50
Enzymes	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Choline	0.10	0.10	0.10	0.10
Vegetable oil	2.90	2.90	2.80	2.80
Mycotoxin binder	0.20	0.20	0.20	0.20
Calculated analysis				
ME (kcal/kg)	3140	3140	3137	3137
CP%	22.4	22.4	22.3	22.3
Crude fiber%	4.42	4.41	4.50	4.50
Ether extract%	4.37	4.38	4.48	4.48
Ca%	0.97	0.97	0.97	0.97

Dietary Treatments				
Ingredients, %	*Control (A)*	*Zigbir (B)*	*UDCM (C)*	*DCM (D)*
Available phosphorous%	0.53	0.53	0.53	0.53
Lysine%	1.11	1.11	1.11	1.11
Methionine%	0.49	0.49	0.50	0.50
Methionine + Cystine%	0.74	0.74	0.75	0.75

*Cp 35%, ME 1900 kcal/kg, C.fiber 2.50%, EE 1.5%, Ash 35%, Ca 7.0%, Av. P 4.5%, Lysine 11%, Methionine 4.2%, Methionine+Cystine 4.3%. Vitamin A stabilised 250.000 I.U./Kg, Vitamin D3 stabilised 50.000 I.U./Kg, Vitamin E stabilised 500 mg/Kg, Vitamin K3 (hetrazeen) 40 mg/Kg,

TABLE II. **COMPOSITION OF BROILER FINISHER DIETS CONTAINING ZIGBIR, UNDECORTICATED MORINGA UDCM AND DECORTICATED MORINGA DCM.**

Dietary Treatments				
Ingredients, %	*Control (A)*	*Zigbir (B)*	*UDCM (C)*	*DCM (D)*
Sorghum	72.10	70.40	70.60	70.60
Sesame cake	3.60	2.80	3.00	3.00
groundnut cake	9.00	11.96	11.50	11.50
Wheat bran	6.20	5.80	5.50	5.50
Super concentrates*	5.00	5.00	5.00	5.00
Lime stone	0.90	0.90	0.90	0.90
D. phosphate	0.10	0.0	0.0	0.0
Enzymes	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Choline	2.70	2.70	2.60	2.60
Vegetable oil	3.60	2.80	3.00	3.00
Mycotoxin binder	0.20	0.20	0.20	0.20
Calculated analysis				
ME (kcal/kg)	3148	3144	3145	3145
CP%	17.75	18.42	18.43	18.43
Crude fiber%	3.91	4.04	4.12	4.12
Ether extract%	3.33	3.40	3.53	3.53
Ca%	0.82	0.80	0.80	0.80
Available phosphorous%	0.45	0.43	0.42	0.42
Lysine%	0.89	0.92	0.92	0.92
Methionine%	0.42	0.42	0.42	0.42
Methionine + Cystine%	0.60	0.61	0.62	0.62

*As shown in Table I.

TABLE III. **THE EFFECT OF DIETARY ZIGBIR, UNDECORTICATED MORINGA UDCM AND DECORTICATED MORINGA DCM ON OVERALL PERFORMANCE.**

Dietary Treatments					
Parameter	*Control (A)*	*Zigbir (B)*	*UDCM (C)*	*DCM (D)*	*±SEM*
0-3 wk					
Feed intake (g/bird)	1183.33 a+15.28	1195.52 a+7.76	1149.67 b+0.58	1147.27 b+4.73	5.13

Dietary Treatments					
Parameter	*Control (A)*	*Zigbir (B)*	*UDCM (C)*	*DCM (D)*	*±SEM*
Body weight gain (g/bird)	746.50+ 5.68	730.78+9 3.34	708.00+2 7.53	776.17+2 1.58	28.82
FCR (g feed /g Bwt gain)	1.59+0. 03	1.66+0.2 3	1.63+0.0 6	1.48+0.0 4	0.07
PER (Bwt gain/protei n consumed)	2.78+0. 05	2.70+0.3 5	2.72+0.1 0	2.99+0.0 9	0.11
4-6 wk					
Feed intake	2640.00 +100.00	2774.81+ 39.90	2788.89+ 49.38	2742.04+ 173.06	60.54
Body weight gain	1106.30 +11.88	1118.50+ 58.08	1063.50+ 110.51	1180.00+ 215.17	71.89
FCR	2.39+0. 07	2.48+0.1 2	2.65+0.3 4	2.38+0.5 0	0.18
PER	2.36+0. 07	2.19+0.1 1	2.07+0.2 5	2.35+0.5 4	0.17
0-6 wk					
Live B W (g/bird)	1899.6+ 10.56	1896.3+1 00.21	1818.5+1 31.63	2003.3+1 95.02	73.89
Feed intake	3823.33 +90.74	3970.33+ 45.39	3938.56+ 49.55	3889.30+ 168.96	58.66
Body weight gain	1852.8+ 11.31	1849.3+1 00.76	1771.5+1 31.61	1956.2+1 94.27	73.79
FCR	2.06 +0.04	2.15 +0.13	2.23+0.2 0	2.00 +0.25	0.100
PER	2.51 +0.04	2.36 +0.14	2.29 +0.19	2.56 +0.33	0.12

Values are means of 3 replicates per treatment (8 bird\replicate).

SEM: Standard error of the means from ANOVA d.f 8.

[ab] Means ± SD with different superscripts in the same row were significantly different ($P \leq 0.05$).

TABLE IV. **THE EFFECT OF DIETARY ZIGBIR, UNDECORTICATED MORINGA UDCM AND DECORTICATED MORINGA DCM ON CARCASS CHARACTERISTICS AND INTERNAL ORGANS.**

Dietary Treatments					
Parameter	***Control (A)***	***Zigbir (B)***	***UDCM (C)***	***DCM (D)***	***±SEM***
Dressing % on hot base	67.44b±4.45	71.68ab±1.59	77.20a±5.68	69.65b ±1.58	2.18
Relative wt of Abdominal fat	2.12±0.56	2.57±0.40	2.28±0.57	1.94±0.30	0.27
Relative wt of breast	32.18 b±1.38	33.78 b±4.93	32.73 b±2.98	39.77 a±2.00	1.81
Meat bone ratio of breast	10.23 ab±1.55	14.16 a±7.68	5.17 b±1.60	4.77 b±0.77	2.32
Relative wt of thigh	27.69±4.11	27.12±1.81	25.06±0.43	26.55±1.73	1.40
Meat bone ratio of thigh	4.06±0.90	4.11±0.24	3.57±1.75	3.63±0.76	0.61
Relative wt of drumsticks	16.94±1.42	14.24±1.09	14.97±2.13	16.34±2.42	1.06
Meat bone ratio of drumsticks	3.50±0.33	3.27±0.73	3.59±0.50	3.23±0.84	0.37

Dietary Treatments					
Parameter	***Control (A)***	***Zigbir (B)***	***UDCM (C)***	***DCM (D)***	***±SEM***
Relative wt of liver	2.07±0.16	1.93±0.11	1.91±0.35	1.93±0.20	0.13
Relative wt of gizzard	1.43±0.35	1.49±0.28	1.55±0.34	1.52±0.08	0.16
Relative wt of heart	0.51±0.09	0.48±0.08	0.54±0.04	0.49±0.03	0.04
Length of Intestine	155.33 b±5.03	160.00 b±5.00	163.33 b±14.43	180.00 a±5.00	4.86

Values are means of 3 replicates per treatment (8 bird\replicate).

[ab] Means ± SD with different superscripts in the same row were significantly different ($P \leq 0.05$).

SEM: Standard error of the means from ANOVA d.f 8.

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