

Full Length Research Paper

Effect of Miadasan as a dietary supplement on performance, Carcass characteristic and blood profile of broiler chickens

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An experiment was conducted to study the effect of Miadiasin as a dietary supplement on the growth performance viz., weight gain, feed intake and feed conversion ratio, carcass characteristics and some blood parameters of broiler chickens. One hundred and twenty one-day old commercial broiler chicks (Arbo acre) were reared in a deep litter poultry house and divided into four (4) groups of thirty (30) birds each. The groups were assigned to four diets containing 0, 0.1, 0.2 and 0.3% Miadiasin. Feed and water were provided *ad libitum* throughout the experimental period which lasted for 42 days. The results showed that there was a significant ($P<0.05$) difference in body weight, weight gain and feed conversion ratio between treatment groups. Diets with 0.3% level of Miadiasin significantly ($P<0.05$) increased body weight gain (2101.9 g), body weight (2206.1g) and feed conversion ratio (1.41) with no mortality. The relative weights of the organs examined were significantly ($P<0.05$) different across dietary treatments. All the haematological parameters evaluated: Pack cell volume (PCV), Haemoglobin (Hb), White blood cell (WBC) were not significantly ($P>0.05$) affected by the inclusion of Miadiasin. Significant influences were not observed for total protein, albumin, and globulin, serum glutamic oxaloacetate transaminase (SGOT) and serum glutamic pyruvate transaminase (SGPT). Miadiasin can be included up to 0.3% level in broiler chicken rations without any adverse effect on growth performance, carcass characteristics and blood profile of birds.

Key words: Miadiasin, Broiler chickens, Performance, Carcass Characteristics, Haematological parameters

INTRODUCTION

The use of antibiotics of pharmaceutical origin has been a method of improving livestock performance for many years; however, there is increasing concern of its resistance and residual effects in the body of animals. Scientists have opted on the use of feed additives (natural) as alternative to antibiotics due to its wide safety margin and efficacy to promote growth performance in animals. The success of modern animal production in supplying large quantity of low cost feed to the human population depends to a large extent on the judicious and creative use of feed additives (FAAN, 2016). A feed additive plays a significant role in maintaining an animal's health, improving the characteristics of feed and growth performance. A wide range of feed additives are authorized for use in animal nutrition, one of which is Miadiasin.

Miadiasin contains hydrolysable tannin and other materials. According to Cowan (1999) tannins are water-

soluble polyphenolic compounds of variable molecular weights abundantly found in nature and have the ability to precipitate protein. Hydrolysable protein are based on gallic acid, usually as multiple esters with D-glucose (Haslam, 1996; Scalbert, 1991). Recent research have shown that tannin performs multiple biological activities, including antibacterial, anti-inflammatory, anti-inflmmatory and anti-carcinogenic properties (Santos-Buelga and Scalbert.,2000; Frankel et al.,1993) making it a good substitutes for antibiotic growth promoters in animal and poultry feeding.

Feed grade diatomaceous earth also contained in Miadiasin is an excellent natural and organic source of silica widely used in agriculture as an anti-caking agent in poultry feed (Capinera, J.L., 2008 and FAO, 2001). The chemical composition of oven-dried diatomaceous earth is 80-90% silica with 2 to 4% (clay minerals) and 0.5-2.0% iron oxide (Antonides, 2010).

Table 1: Composition of experimental (Broiler starter) diets (%)

Ingredients	Diets			
	1	2	3	4
Maize	51.95	51.85	51.75	51.65
Soy bean meal	26.00	25.00	26.00	25.00
Groundnut cake	16.00	17.00	16.00	17.00
Bone meal	3.00	3.00	3.00	3.00
Limestone	2.00	2.00	2.00	2.00
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.30	0.25	0.25	0.25
Miadiasin	0.00	0.10	0.20	0.30
Total	100	100	100	100
Determined Analysis				
Crude protein (%)	23.19	23.10	23.17	23.09
Crude Fibre (%)	4.00	4.01	4.00	4.02
Ether extract (%)	3.90	3.91	3.90	3.92
Ash (%)	6.67	6.70	6.66	6.71
Energy (ME kcal/kg)	3140.64	3138.41	3130.52	3101.05

*Premix supplied per kg diet :- Vit A, 12,000 I.U; Vit E, 5mg; Vit D3, 3000I.U, Vit K, 3mg; Vit B2, 5.5mg; Niacin, 25mg ; Vit B12, 16mg ; Choline chloride, 120mg ; Mn, 5.2mg ; Zn, 25mg ; Cu, 2.6g ; Folic acid, 2mg ; Fe, 5g ; Pantothenic acid, 10mg ; Biotin, 30.5g ; Antioxidant, 56mg.

Therefore, the aim of this study is to evaluate the effect of Miadiasin as a dietary supplement on the growth performance, carcass characteristics and blood profile of broiler chickens.

MATERIALS AND METHODS

Experimental site

The experiment was carried out at Dan- malafia Farms, Oyo State, Nigeria. The area is located within the derived savanna zone of Nigeria.

Animals and their management

One -day old 120 broilers (Arbo acre) were obtained from a commercial hatchery in Ibadan. The chicks were reared in group and feed for one week before the start of the experiment on a commercial starter feed (adaptation period). At the end of the adaptation period, all chicks were weighed and assigned into four (4) dietary treatment groups; each group was further divided into three replicates each of ten (10) chicks in a completely randomized design (CRD). A deep litter poultry house was used; the house was cleaned and well disinfected before the commencement of the experiment. Vaccines were administered according to the prevailing vaccination schedule in the environment. Feed and water were offered ad-libitum. The light was continuous throughout the experimental period, the performance of the birds in terms of feed intake and mortality were recorded 42 days throughout the period of the experiment which lasted for

Preparation of experimental diet

Miadiasin (test material) used in this experiment was purchased from Agricare in Ibadan. The test ingredients were mixed with other ingredients to form (4) experimental diets at levels of 0, 0.1, 0.2 and 0.3% as presented in Table 1 and 2.

Parameters measured

The initial body weight was recorded at the beginning of the experiment and weekly thereafter, total feed and water consumption, mortality were recorded daily throughout the experimental period.

Blood analysis

At the 7th week of the experiment, blood samples were collected from the brachial vein of six randomly selected birds per treatment. The blood samples were analyzed for some hematological and serum biochemical parameters; blood samples for hematology were collected into bottles containing Ethylene Diamine Tetra Acetate (EDTA). The hematological parameters such as Pack cell volume (PCV), Red blood cell (RBC), White blood cell (WBC), Haemoglobin concentration (Hb) and absolute counts of neutrophils, lymphocytes, monocytes and eosinophils were computed according to the method of Jain (1986).

Blood samples that were meant for serum biochemistry were collected into other bottles free from any anticoagulant. The serum total protein, Albumin and Globulin were computed according to (Doumas and

Table 2: Composition of experimental (Broiler finisher) diets (%)

Ingredients	Diets			
	1	2	3	4
Maize	60.00	59.90	59.80	59.70
Wheat Offal	5.00	5.00	5.00	5.00
Soy bean meal	17.00	17.00	17.00	17.00
Groundnut cake	12.00	12.00	12.00	12.00
Bone meal	3.00	3.00	3.00	3.00
Limestone	1.50	1.50	1.50	1.50
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30
Miadiasin	0.00	0.10	0.20	0.30
Total	100	100	100	100
Determined Analysis				
Crude protein (%)	20.19	20.10	20.17	20.09
Crude Fibre (%)	4.10	4.11	4.09	4.12
Ether extract (%)	3.20	3.21	3.20	3.22
Ash (%)	6.67	6.70	6.66	6.71
Energy (ME kcal/kg)	2990.64	2990.41	2990.52	2991.05

*Premix supplied per kg diet :- Vit A, 12,000 I.U; Vit E, 5mg; Vit D3, 3000I.U, Vit K, 3mg; Vit B2, 5.5mg; Niacin, 25mg ; Vit B12, 16mg ; Choline chloride, 120mg ; Mn, 5.2mg ; Zn, 25mg ; Cu, 2.6g ; Folic acid, 2mg ; Fe, 5g ; Pantothenic acid, 10mg ; Biotin, 30.5g ; Antioxidant, 56mg.

Table 3: Chemical composition of Miadiasin.

Ingredients	Quantity
Calcium carbonate	0.20%
1, 2 Propanediol	0.20%
Plant extracts (Hydrolysable tannins)	400,000mg
Diatomaceous earth (Silica)	89.0%

Briggs, 1972), Glutamic oxaloacetate transaminase (SGOT), Glutamic phosphatase transaminase (SGPT) was determined according to Scott (1965).

Carcass Evaluation

At the end of the seventh week, five birds were randomly selected per treatment; they were fasted overnight and given only water, weighed and slaughtered. After evisceration, the organs were removed and weighed. The carcass weight, dress weight, weight of the visceral organs and other parts of the birds were also recorded.

Cost Benefit Analysis

Cost analysis of each diet fed to the experimental birds was calculated. The cost of per kg of ingredient was used to multiply the total feed intake per bird to obtain the total cost of feed consumed during the experimental period.

Chemical Analysis

The proximate compositions of the four experimental diets were determined by the method of A.O.A.C (1990).

Statistical Analysis

All data collected were subjected to one way Analysis of variance (ANOVA) by Steel and Torrie (1980). Significant means separated by Duncan multiple range test (Duncan, 1955).

RESULTS

Table 1 and 2 reveals the proximate composition of experimental diets. The proximate components reveal that the crude protein of broiler starter mash ranges between 23.09-23.19% while those of broiler finisher are between 20.09-20.10 all values obtain fall within the range recommended by NRC (1994) for birds.

The chemical composition of Miadiasin is presented in Table 3. The values obtained are 0.20%, 0.20%, 0.20% and 400,000mg for calcium carbonate, 1,2 propanediol, diatomaceous earth and plant extracts (hydrolysable tannins) respectively.

The growth performances as influenced by the diets are presented in table 4. The average final weight ranges between 1989.3-2206.1g. There was a significant

Table 4: Effect of different levels of Miadiazin on the performance of broilers

Parameters	Diets				SEM
	1	2	3	4	
Performance (g)					
Number of birds	30.0	30.0	30.0	30.0	-
Initial live weight (g/bird)	104.0	103.0	102.0	104.0	10.20
Final live weight (g/bird)	1989.3	2090.2	2104.1	2206.1	41.07
Total feed intake (g/bird)	3380.7	3105.0	3130.8	3102.4	99.12
Total weight gain (g/bird)	1885.3	1987.2	2002.0	2101.9	15.61
Feed conversion ratio (FCR)	1.70	1.49	1.49	1.41	0.26
Daily water intake (lit/day)	22.0	22.2	22.6	22.8	1.06
Mortality	8.00	4.00	2.00	0.00	0.06
% Mortality	2.60	1.30	0.67	0.00	0.12
Cost-benefit analysis					
Feed cost /kg	140.0	142.0	450.80	146.0	7.90
Cost of F.C/bird/6wks/Trt (₦)	473.30	440.91	450.80	460.00	4.56
Cost of D.C /kg (₦)	750.0	750	750.0	750	-
N.B.P.T @ 7 wks	22.0	26.0	28.0	30.0	1.60
Cost of day old chicks (₦)	130.0	130.0	130.0	130.0	-

F.C/ Trt: feed cost per treatment

D.C: Dressed Chicken

N.B.P.T: Number of birds per treatment

Table 5: Effect of feeding different levels of Miadiazin on haematological parameters of broilers.

Parameters	Diets				SEM
	1	2	3	4	
Pack cell volume (%)	38.44	38.09	38.99	39.01	1.64
Haemoglobin (g/dl)	15.20	15.71	15.89	15.09	0.20
Red blood cell (10)6mm	2.00	2.03	2.16	2.19	0.09
White blood cell (10)6mm	11.77	11.80	12.08	12.11	1.87
Neutrophil (%)	71.11	70.88	71.60	71.34	3.04
Monocytes (%)	3.01	3.80	3.01	3.11	9.11
Lymphocytes (%)	48.77	49.09	49.11	49.87	1.66
Eosinophils (%)	4.01	4.11	4.06	4.08	0.37

difference ($P < 0.05$) among the treatments in terms of the live weight. The average feed intake values obtained are 3380.7, 3105.0, 3130.8 and 3102.4 (g/bird) for diets 1, 2, 3 and 4 respectively while those of the total weight gain are 1885.3, 1987.2, 2002.0 and 2101.9 (g/bird) for diets 1, 2, 3 and 4. The feed conversion ratio values obtained are 1.70, 1.49, 1.49 and 1.41 for diets 1, 2, 3 and 4 respectively while those of daily water intake are 22.0, 22.2, 22.6 and 22.8 liters for diets 1, 2, 3 and 4. The average feed intake and daily water intake were not significantly affected ($P > 0.05$) by the dietary inclusion of Miadiazin, the feed intake gradually decreases from diet 1 to 4, while the water intake gradually increased from diet 1 to 4. The total weight gain and the feed conversion ratio (FCR) values were significantly ($P < 0.05$) different among the dietary treatments.

Table 5 reveals the values of the hematological parameters investigated; the pack cell volume (PCV) values obtained are 38.44, 38.09, 38.99 and 39.01% for diets 1, 2, 3 and 4 respectively while those of hemoglobin (Hb) values obtained are 15.20, 15.71, 15.89 and 15.09

g/dl for diets 1, 2, 3 and 4. The Red blood cell (RBC) are 2.00, 2.03, 2.16 and 2.19 (10)6mm for diets 1, 2, 3 and 4 respectively while those of White blood cell (WBC) are 11.77, 11.80, 12.08 and 12.11 (10)6mm for diets 1, 2, 3 and 4 respectively. The pack cell volume (PCV), haemoglobin (Hb), red blood cell (RBC) were not significantly ($P > 0.05$) different among the dietary treatments. The neutrophil values obtained are 71.11, 70.88, 71.60 and 71.34 % for diets 1, 2, 3 and 4 respectively while those of monocytes values are 3.01, 3.80, 3.01 and 3.11 % for diets 1, 2, 3 and 4. The lymphocytes values obtained are 48.77, 49.09, 49.11 and 49.87% for diets 1, 2, 3 and 4 respectively while those of eosinophils values are 4.01, 4.11, 4.06 and 4.08% for diets 1, 2, 3 and 4 respectively. White blood cell, neutrophils, lymphocytes, monocytes and eosinophils were not significantly ($P > 0.05$) influenced by different inclusion of Miadiazin.

The serum biochemical parameters as influenced by the diets are presented on table 6. The albumin values obtained are 1.56, 1.50, 1.55 and 1.49 g/dl for diets 1, 2,

Table 6: Serum biochemical indices of broilers fed different levels of Miadiasin

Parameter	Diets				SEM
	1	2	3	4	
Albumin (g/dl)	1.56	1.50	1.55	1.49	0.81
Globulin (g/dl)	1.26	1.15	1.22	1.39	0.22
Total protein (g/dl)	2.76	2.65	2.78	2.88	0.05
SGPT (iu/l)	17.90	17.55	17.04	17.60	0.24
SGOT (iu/l)	98.06	98.89	98.01	98.66	5.06

SGPT: Serum glutamic pyruvate transaminase
 SGOT: Serum glutamic oxaloacetate transaminase

Table 7: Carcass characteristics and relative organ weights of broilers fed Miadiasin.

Parameters	Diets				SEM
	1	2	3	4	
Dressing percentage	89.70	91.16	96.90	97.11	10.61
Head	4.10	6.21	6.47	6.82	0.15
Neck	3.11	4.13	4.23	4.33	0.11
Thigh	7.03	10.15	10.34	10.90	0.91
Shanks	4.80	7.22	7.54	7.92	1.60
Liver	1.92	2.37	2.66	2.91	0.31
Pancreas	0.26	0.41	0.48	0.59	0.14
Gizzard	2.07	3.11	3.14	3.17	0.21
Proventriculus	0.47	0.73	0.71	0.79	0.17
Intestine (cm)	131.2	155.9	166.0	168.9	6.67

3 and 4 respectively while those of globulin values are 1.20, 1.15, 1.22 and 1.39 g/dl for diets 1, 2, 3 and 4. The total protein values obtained are 2.76, 2.65, 2.79 and 2.88 g/dl for diets 1, 2, 3 and 4 respectively. Albumin, globulin and total protein were not significantly ($P>0.05$) influenced by different inclusion of Miadiasin. The SGPT values obtained are 17.90, 17.55, 17.04 and 17.60 iu/l for diets 1, 2, 3 and 4 while those of SGOT are 98.06, 98.99, 98.01 and 98.66 iu/l for diets 1, 2, 3 and 4 respectively, though the SGOT increased from diet 1 to 4, a non – significant ($P>0.05$) differences were obtained in the values.

The carcass characteristics and the relative organ weights of broilers fed different levels Miadiasin is presented in table 7. The relative weights of the head, neck, thigh, shanks, liver, pancreas, gizzard, proventriculus and intestine fed Miadiasin were significantly ($P<0.05$) different from the control diets. The dressing weight of the birds ranged from 89.70-97.11, there was a significant difference ($P<0.05$) among the treatments in terms of the dressing percentage.

DISCUSSION

The highest feed intake was recorded in broilers fed diet 1, followed by diet 3, 4 and 2 respectively across the experimental period (7 weeks), however, there was a significant ($P<0.05$) differences in the final live weight of the birds. Broilers fed diet 4 had the highest weight gain

followed by diet 3, 2 and 1 respectively, the result obtained agree with the findings of Safa M A El Tazi et al (2014) when garlic essential oil was supplemented in the diets of broilers. According to Fernandez et al (1998) feed grade diatomaceous earth which is also present in Miadiasin can serve as a source of natural anthelmintic (dewormer) which in turns allows the efficient absorption of nutrients. It also prevents poultry feed caking FDA (2001). There was a significant ($P<0.05$) difference in the mortality rate of the birds, this could be due to the presence of tannin in the test material (Miadiasin), Buelga and Scalbert (2000) reported that tannin is rich in antioxidants and can also act as antibacterial, antimicrobial and antifungal. According to Wenk (2000) Antimicrobial agents that are used as feed additives develop their activity in the digestive tract. Birds fed diet 1 had the highest mortality of 8, followed by diets 2 and 3 respectively. No mortality was recorded in birds fed with diet 4, this report agrees with the findings of Li and Song (2004).

The non-significant ($P>0.05$) differences in the values obtained for daily water intake and feed cost per kilogram across the treatment groups agrees with the findings of Ojabo et al (2012) when rabbits are fed sweet orange peels, the water intake is a clear indication that the intestinal walls of the birds are well protected.

Haematological studies represent a useful process in the diagnosis of diseases as well as investigation of the extent of damage to blood (Isaac et al, 2013); animals with good blood composition reflect good performance

(Bamishaiye et al, 2009). There was no significant ($P>0.05$) differences in the haematological parameters investigated, it shows that the animals were well nourished. The experimental diet contains enough protein, energy and minerals, which are necessary for the normal functioning of the animal's body. The values for all the parameters fall within the normal range values established for birds by Ibrahim Albokhadaim (2012); H. A. A. Elagib and A.D.A Ahmed (2011). Haematological parameters like Hb value, WBC, RBC among others are used in routine screening for the health and physiological status of livestock (Aro et al, 2013).

According to Ologun and Ikeobi (2006) RBC serves as a carrier of haemoglobin, transport of oxygen and carbon dioxide in the body (Isaac et al, 2013), PCV is involved in the transport of oxygen and absorbed nutrients (Maton et al, 1993). Hemoglobin plays a vital role in oxygen transportation to tissues of animals (Soetan et al, 2013). Adeyinka and Bello (2013) reported that WBC and its differentials are fight infections and produce antibodies to protect the body. The total protein, albumin and globulin of the broilers used in this experiment were not affected ($P>0.05$) by the inclusion of Miadiasin. Olajide et al (2009) reported that diets have measurable effects on blood components. Albumin content in the blood are easily influenced by protein shortage, the results obtained is an indication that the experimental diets contained enough protein to support the normal protein reserves across the group. The values for all the parameters fall within the normal range values established for birds by Ibrahim Albokhadaim (2012).

The values obtained for SGPT and SGOT were not significantly ($P>0.05$) different among the treatment. According to Iyayi (1994) SGPT and SGOT values usually respond to the presence of toxic substances in the diet. The results obtained agrees with the findings of Iheukwumere et al (2002) but contrary to the report of Olabanji et al (2007) when rabbits were fed Wild sunflower meal blood meal mixture.

Dietary Miadiasin affected the carcass and organ weight of the birds significantly ($P<0.05$), this results obtained in this experiment is contrary to the reports of Bolu et al (2009) when dried pawpaw seeds were fed to broiler chickens. According to Madhusadha et al (1986) antinutrients are causes of internal organs enlargement in birds, the significant differences in the carcass characteristics could also be attributed to the quality of diet in each treatment.

CONCLUSION

The growth and carcass characteristics measured showed significant differences. It could therefore be concluded that Miadiasin could be efficiently utilized and tolerated by broiler chickens up to 0.3% inclusion level without any negative effect on the performance and

health status of broiler chickens.

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