International Journal of Agricultural Science Research Vol. 6(4), pp. 018-023, September 2017
Available online at http://academeresearchjournals.org/journal/ijasr
ISSN 2327-3321 ©2017 Academe Research Journals

Full Length Research Paper

Carcass and performance characteristics of broiler chickens fed with *Cymbopogon citratus* leaf meal as alternative to Mycotoxin binder.

Chioma Gibson Ogbonna[1], Akinsoyinu Oladele Akintunde[1], Olumide Martha Dupe[1], Ajayi Opeyemi Arinola[1], Ndubuisi-Ogbonna Lois Chidinma[1], Akinboye Olufunso Emmanuel[1], Adeyeye Joshua A.[2], Ayo-Bello Taofeek[1] and Afodu Osagie John[1]*.

[1]Department of Agriculture and Industrial Technology, Babcock University Ilisan Remo, Ogun State. Nigeria
[2]Department of Nutrition and Dietetics, Babcock University Ilisan Remo, Ogun State. Nigeria

Accepted 26 September, 2017

The study used a total of one hundred and eighty day old broiler arbo acre chicks were fed with graded level of *Cymbopogon citratus* for 8 weeks in order to check the efficacy as alternative to Mycotoxin binder in aflatoxin contaminated feed of broiler chicken. Six dietary treatments were formulated: A (control diet) B (contaminated feed with aflatoxin) C (contaminated feed with Mycotoxin binder) D1 (contaminated feed with *Cymbopogon* at 0.01%) D2 (contaminated feed with *Cymbopogon* at 0.1%) and D3 (contaminated feed with *Cymbopogon* at 0.2%), respectively. Data were collected and analyse on carcass and performance characteristics with 6 birds representing each treatment in a complete randomize design values were express in percentage of body weight. Results show that performance parameters of final body weight gain feed intake feed conversion ratio are significant (p<0.05) from the control diet but no significant different among the treatment (p<0.05). Carcass and internal organ shows no significant (p <0.05) with the control diet the breast part ranges from 26.04-22n.64% control diet had the highest value while treatment D0.01 had the lowest value the thigh were significantly different values ranging from 12.65-11.42%, respectively. The internal organ shows significant (p<0.05) across the treatment with C having the highest value for gizzard and diet D2 having the lowest value the liver value ranges from 2.71-2.30 with the control diet having the highest value. It can therefore be concluded that *Cymbopogon citratus* is effective as toxin binder in poultry feed without any negative implication on both internal and external characteristics of the bird

Keywords: *Cymbopogon citratus,* Leaf meal, Performance, Carcass

INTRODUCTION

Poultry meat is a rich source of high quality protein, minerals and vitamins. Due to economic importance attached to chicken and their product give rise to the need for food safety which is imperative in food production worldwide. There are numerous Mycotoxins in the food chain that causes unwanted biological effects in human and animal organisms upon ingestion (Bryden, 2007). High levels of Mycotoxin in food and feed result into acute mycotoxicosis and high mortality. Lower levels cause chronic mycotoxicosis sometimes without manifested clinical symptoms but followed by considerable decrease in production performance, immunosuppressive effects and the occurrence of toxic residues in poultry meat and eggs (Sinovec *et al.,* 2006). This calls for a serious attention with regard to the quality of chicken meat available to the Nigeria population especially with the high incidence of Mycotoxin in the poultry feed and feeding stuff. (Sinovec *et al.,* 2006). In most developing countries, low income earners such as rural farmers employ ethno-medical practices to control human and farm animal diseases. The leaves, seeds, fruits, barks and roots of some plants are used in the

Corresponding author. E-mail: oafodu@gmail.com.

preparation of syrups and infusions for the treatment of common diseases. The active constituents contributing to these curative effects are the phytochemicals, vitamins and minerals (Okwu and Ekeke, 2003). *Cymbopogon citratus, Acacia alata, Allium sativum, Ocimum santum Azadirachta indica* and *Andrographis paniculata* among other plants have been reported to have anti-bacterial, anti-oxidant, immune-potentiating, hepato-protective, antifungal and anti-parasitic activities (Sahin *et al.,*, 2003, Kitani *et al.,*2001). Taweechaisupapong *et al.,* (2012) and Bokhari (2009) reported the use of *C.citratus* oil in the treatment of dermertophytosis. However, this study investigated the efficacy of *Cymbopogon citratus* leaf meal as Mycotoxin binders in broiler poultry feed.

METHODOLOGY

Experimental Site

The experiment was carried out at the poultry and livestock unit of Babcock University Teaching and Research farm Ilara Remo Ogun State. *Cymbopogon citratus* were harvested from Babcock University Ilishan Remo Ogun State the plants was identified and properly authenticated at the department of Biological Sciences, Babcock University.

Experimental animal and Design

One hundred and eighty (180) day-old chicks of Arbor-Acre broiler strain were purchased from Ajanla farms, along Lagos-Ibadan expressway. These were randomly allocated to six (6) dietary treatments of A, B, C, D_1, D_2, D_3 in a complete randomize design in triplicate with 10 birds per replicate. Birds were raised on deep litter system, feeding troughs were provided at the ratio of 10 chicks per trough through the 8 weeks.

Leaf Meal Preparation

Mature fresh leaves of *Cymbopogon citratus* were harvested. Harvesting was done between the hours of 016 and 017 hours when the plants must have completed their light stage of photosynthetic process for the day. The quantity of leaves needed was air dried at an average room temperature of 27^0C for seven days and further oven dried to constant weight at 40^0C for ten hours and then milled with a hammer mill sieve of 0.02mm diameter (Makanjuola, 1984), to obtain a fine powdery dust stored at 4^0C in the fridge until ready for use.

Table 1 shows the formulation of the broiler starter mash for the experiment.

Table 2 shows the formulation of broiler finisher diet of the experiment.

Collection of Data

Data were collected to assess the performance of the broilers in terms of, feed intake (g), weight gain /week and feed consumption to weight ratio on weekly basis. Carcass evaluation was obtained from 3 birds from each replicate total 54 birds randomly selected. Primal cuts: (breast, thigh, drumstick, back, wing, neck, shank *etc*) and visceral organs (liver, kidney, lungs heart, empty gizzard, whole gizzard and gastro intestinal tract) were harvested.

Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using (SAS, 2003) at significant ($P < 0.05$) means were compared using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Proximate Composition of *Cymbopogon citratus* Leaf Meals

It was observed from Table 3 that *Cymbopogon citratus* serve as a good source of crude protein and crude fibre in poultry feed with (25.78%) and (4.59) respectively which is in accordance with NRC 1994 ether extract (6.35%) and (2.99) indicated Cymbopogon cannot be used as source of mineral in poultry feed as a result of low in mineral composition.

Proximate Composition of Starter feeds of Broiler Chicken Fed *Cymbopogon citratus* Leaf Meals as Alternatives to Mycotoxin Binders

Table 4 shows the starter diet, the percentage dry matter and crude protein did not follow any particular trend. Crude protein in this experiment ranged from 22.68% to 23.23% for starter and 19.52% to 19.60% for finisher. These agree with the value recommended by (NRC, 1994).apparent variation in Ether extract (EE), Crude Fibre (CF), Carbohydrate (CHO) and metabolizable energy (Kcal/kg) was not statistically significant ($P > 0.05$). Table 5 shows the proximate analysis of the finisher diet fed to the broilers.

Performance Characteristics of Broiler Chicken Fed *Cymbopogon citratus* leaf Meals as Alternatives to Mycotoxin Binders

Table 6 shows the Feed intake (FI) values were consistent with mean value of 4.98kg (4980g) at the end of eight weeks (8wks). The treatment effects were not significant ($P>0.05$). All the birds have positive weight gain (g) which ranged from 392.0 for birds on treatment C to 470 for those on treatment A (control diet). The apparent variations were significant ($P<0.05$). Birds on D 0.01% recorded average weight of 437g compared to the control diet. In the same vein, as the aflatoxin

Table 1. Gross Composition of Broiler Starter Experimental diet

Ingredients	Diet A 10.5ppb aflatoxin	Diet B 151ppb Aflotoxin	Diet C 151 ppb aflatoxin plus 0.01% of Mb	D_1 151ppb aflatoxin plus 0.01% of Cc	D_2 151ppb aflatoxin plus 0.1% of Cc	D_3 151ppb aflatoxin plus 0.2% of Cc
Maize	55.00	55.00	55.00	55.00	55.00	55.00
GNC	20.00	20.00	20.00	20.00	20.00	20.00
SBM	14.30	14.30	14.30	14.30	14.30	14.30
Fish meal (72%cp)	3.00	3.00	3.00	3.00	3.00	3.00
Wheat offal	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00	1.00
DCP	2.00	2.00	2.00	2.00	2.00	2.00
PKC	2.00	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10	0.10
	0.10	0.10	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100
CP	23.08	23.08	23.08	23.08	23.08	23.08
ME(kcal/kg	2960	2960	2960	2960	2960	2960
EE	4.41	4.41	4.41	4.41	4.41	4.41
CF	3.85	3.85	3.85	3.85	3.85	3.85

Table 2. Gross Composition (%) of Broiler Finisher Experimental diet

Ingredients	Diet A 12.00ppb aflatoxin	Diet B 400ppb Aflotoxin	Diet C 400ppb aflatoxin plus 0.01% of Mb	D_1 400ppb aflatoxin plus 0.01% of Cc	D_2 400ppb aflatoxin plus 0.1% of Cc	D_3 400ppb aflatoxin plus 0.2% of Cc
Maize	59.00	59.00	59.00	59.00	59.00	59.00
GNC	17.00	17.00	17.00	17.00	17.00	17.00
SBM	8.00	8.00	8.00	8.00	8.00	8.00
Fish meal (72%cp)	1.00	1.00	1.00	1.00	1.00	1.00
Wheat offal	5.30	5.30	5.30	5.30	5.30	5.30
Limestone	1.50	1.50	1.50	1.50	1.50	1.50
DCP	2.00	2.00	2.00	2.00	2.00	2.00
PKC	5.50	5.50	5.50	5.50	5.50	5.50
Common Salt	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10	0.10
Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100
Crude protein	19.52	19.52	19.52	19.52	19.52	19.52
Metabolizable energy (kcal/kg)	2998	2998	2998	2998	2998	2998
Ether extract	4.42	4.42	4.42	4.42	4.42	4.42
Crude Fibre	3.72	3.72	3.72	3.72	3.72	3.72

Table 3. Showing Proximate Composition of *Cymbopogon citratus* Leaf Meals

Parameters	*Cymbopogon citratus* (%)
Crude protein	25.78
Ash	2.99
Ether extract	6.35
Crude fibre	4.95
Dry matter	93.60
NFE	53.53

Table 4. Proximate Composition of Starter Diet Containing Cymbopogon Citratus Leaf Meals as Alternatives to Mycotoxin Binders.

Parameters	A(0%)	B	C	D1 0.01%	D2 0.1%	D3 0.2%	SEM
Crude protein	23.23	22.80	22.68	22.73	22.88	23.23	0.67
Ash	5.95	6.01	5.95	6.07	5.99	5.97	0.17
Ether Extract	6.40	6.05	6.40	6.35	5.95	5.80	0.32
Crude fibre	5.01[a]	5.3[a]	5.10[a]	5.00[a]	4.95[b]	5.00[a]	0.33
Dry matter	92.94	93.27	93.86	93.74	92.84	92.69	0.42
NFE	52.59	53.0	51.61	52.31	50.52	53.44	0.52
Gross energy Kcal/g	6.81	6.90	6.85	6.90	6.85	6.86	0.01

a, b, c : Means on the same row with the same superscript are not significantly different (p>0.05). NFE – Nitrogen free extract

Table 5. Proximate Composition of Finisher diet containing *Cymbopogon citratus* Leaf Meals as Alternatives to Mycotoxin Binders

Parameters	A	B	C	D1(0.01)	D2(0.1)	D2 (0.2)	SEM
Crude protein	19.60	19.60	19.60	19.60	19.60	19.60	0.56
Ash	5.10	4.90	5.70	4.80	5.70	5.70	0.15
Ether extract	5.90	5.70	5.60	5.70	5.90	5.90	0.29
Crude fibre	4.80	4.80	4.80	4.79	4.79	4.78	0.25
Dry matter	92.40	92.50	92.30	91.60	91.50	91.50	0.30
NFE	55.50	50.50	56.52	52.00	55.30	53.60	0.25
Gross energy	7.80	7.90	7.85	7.90	7.85	7.86	0.01

a,b,c Means on the same row with the same superscript are not significantly different (p>0.05)
NFE, nitrogen free extract SEM=Standard Error of Mean

Table 6. Showing performance characteristics of broiler chicken fed Cymbopogon citratus leaf meal

Parameters	A(0%)	B	C	D1(0.01%)	D2 (0.1%)	D3(0.2%)	SEM
Initial body weight (g)	51.20	51.20	51.20	51.20	51.20	51.20	0.84
Final weight gain (g)	2768[a]	2609[ab]	2499[ab]	2599[ab]	2599[ab]	2519[ab]	0.24
Average Weight gain (g)	470.00[a]	410.00[d]	392.00[e]	442.00[c]	437.00[b]	427.00[c]	0.90
Feed intake(g)	4980	4980	4980	4980	4980	4980	0.08
FCR	1.80	1.90	2.00	1.90	1.90	2.00	1.60
Survivability (%)	97.00	100.00	100.00	97.00	100.00	100.00	0.72

a,b,c means on the same row with the same superscripts are not significantly different (p>0.05) SEM=Standard Error of Mean

contaminated feed with *Cymbopogon citratus* increases the weight gains also declined appreciably (P<0.05). This may be as a result of the presence of antinutritional factors such as tannins, alkaloid, and flavonoids which are present in the leaf meal (Matasyoh *et al.,* 2007 and Ojimelukwe *et al.,* 2012). The aflatoxin contaminated feed with toxin binder (Treatment C) experience a decline in weight gain. (P<0.05) feed conversion ratio were not significant (p>0.05) with toxic aflatoxin contaminated meal (or toxic *Aspergillus flavus* meal).The trend of the data suggested that the toxin binder was not as effective as *Cymbopogon citratus* leaf meal at 0.1% to 0.2% levels of leaf meal.

Carcass Characteristics of Broiler Chicken Fed *Cymbopogon citratus* Leaf Meal as Alternative to Mycotoxin Binders

From Table 7, it was observed that Carcass characteristics of the study showed a significant difference (p<0.05) in live weight, ranging from 2820g in the control diet and the lowest value of 2530g in diet C. treatment B-D0.2 are not significant (p>0.05) .This suggests that the leaf meals competed favourably with

Table 7. Carcass Characteristics of Broiler Chicken Fed *Cymbopogon citratus* Leaf Meals as Alternatives to Mycotoxin Binder

Parameters(g)	A	B	C	D1(0.01)	D2(0.1)	D3 0.2%	SEM
Live weight	2820^{a}	2660^{ab}	2550^{ab}	2650^{ab}	2650^{ab}	2570^{ab}	0.16
Bled weight	2720^{a}	2550^{ab}	2450^{ab}	2570^{ab}	2570^{ab}	2450^{ab}	0.18
Defeathered weight	2570^{a}	2450^{ab}	2280^{b}	2310^{b}	2430^{ab}	2310^{b}	0.18
Eviscerated weight	2310^{a}	2270^{ab}	2040^{bc}	2010^{c}	2150^{abc}	2020^{bc}	0.18
Dressed weight %	71.34^{b}	75.37^{a}	71.76^{b}	69.05^{bc}	73.88^{ab}	70.81^{b}	0.18
Neck%	3.07	3.13	2.87	2.51	3.39	2.72	1.43
Back %	18.68	17.79	18.74	18.74	20.50	18.41	3.31
Breast%	26.04	23.81	23.92	22.64	23.39	25.03	3.57
Thigh %	13.00^{a}	11.78^{ab}	12.29^{ab}	11.45^{ab}	11.95^{ab}	11.67^{b}	2.82
Drum stick %	12.65^{a}	12.28^{ab}	12.42^{ab}	11.95^{bc}	11.70^{ab}	11.54^{bc}	2.61
Gizzard%	2.54^{ab}	2.51^{bc}	3.00^{ab}	2.52^{bc}	2.26^{c}	2.33^{c}	2.92
Liver%	2.71^{ab}	2.50^{bc}	2.35^{c}	2.26^{d}	2.38^{c}	2.20^{c}	1.16
Heart %	1.41^{b}	1.50^{ab}	1.56^{a}	1.50^{ab}	1.13^{c}	1.16^{c}	0.48

a,b,c means on the same row with the same superscripts are not significantly different (p>0.05) SEM=Standard Error of Mean

the commercial Mycotoxin binder. There was a significant difference (P<0.05) in dressed weight, with Diet B having the highest value of 75.37% compared with Diet A with 71.34%. This agrees with Barden (1970) results with commercial broiler chickens, line 50x vantress cross, which responded to the several fungus infected diets with no extreme adverse effects.

Galante, et. al. (1998) had a similar result when Trichoderma spp of fungi that produce lytic enzymes were introduced into livestock feed to partly hydrolyse or digest plant cell wall in feed thus enhancing digestibility and increase the nutritive value of the feed.

Breast weight was significant (p<0.05) with the control diet having the highest percentage of 26.04 per cent while diet D0.01% had 22.64% as the lowest value.

Thigh and drumstick followed the same trend of the values from the control diet having the highest percentage values of 13.00 per cent and 12.65 per cent while diet E0.2% had the lowest percentage values of 10.94 per cent and 11.20 per cent. Both were significantly (p<0.05) different. The percentage value of gizzard was highest in diet B (3.0%) and lowest in D 0.1% (2.26%). This was significant (p<0.05) compared with the control diet. This may be attributed to high fibre content of the leaf meal which resulted in an increased grinding activity of the gizzard or anti-nutritional factors in the diet (Forbes and Coras, 1985, Abdul-rahman *et al.,* 2009). Heart highest percentage was obtained from C, (1.58%) while the lowest, 1.13% was obtained from diet D0.1% which were significantly (p<0.05) different

CONCLUSION

Cymbopogon citratus leaf meal is environmental friendly, readily available with no residual effect on the meat of the animal. It can be concluded that *Cymbopogon citratus* leave meal can be used to combat the effect of Mycotoxin in animal feed at 0.2% instead of Mycotoxin binders without any adverse effect on internal organ, health, carcass and performance of the broiler chicken

REFERENCES

Abdul-rahman SY, Abdul-Majeed AF, Alkatan MM (2009). Effect of sesame seeds on Blood Physiological and biochemical parameters in Broiler Breeder Hens. J. Vet. Sci., 23:25-28.

Bokhari FM (2009). Antifungal activity of some Medicinal plants used in Jeddah, Saudi Arabia. *Mycopathology*. 7(1): 51-57.

Bryden WL (2007). Mycotoxin in food chain: human health implication. Asian J. Clin. Nutr., 16(1):95-101.

Forbes JM, Coras M (1995). Application of diet selection by poultry with particular Reference to whole cereals. World's Poult. Sci. J., 51.149-165.

Kitani K, Minami C, Yamamoto T, Maurama W, Kanai S, Ivy GO, Carrillo MC (2001). Do antioxidant strategies work against aging and age – associated disorders? Proparylamines: A possible oxidant strategy.

Makanjuola GA (1984). Feedmill establishment and operations I: plant design and operational procedures. In: Proceedings of a feedmill management training workshop, held at the University of Ibadan on 10 April to 2 May, 1984. Editors: Ogunfowora, O.,Olayemi, J.K, and Mabawonku, A.F., (1989). Feedmill Management in Nigeria: Federal Livestock Department.Ibadan University Press, University of Ibadan, Ibadan Nigeria.67-81.

Matasyoh LG, Josphat CM, Francis NW, Miriam GK, Anne WTM, Titus KM (2007). Chemical composition and antimicrobial activity of the essential oil of *Ocimum gratissimum L*. growing in Eastern Kenya. Afr. J. Biotechnol. 6:760-765.

National Research Council (NRC) (1994). Nutrient Requirements for poultry 9th edition; National Academy of Science; Washington DC, USA.

Okwu DE, Ekeke O (2003). Phytochemical screening and mineral composition of chewing sticks in south eastern Nigeria. Global J. Pure Appl. Sci., 9:235-238.

Sahin A, Yener Z, Dagoglu G, Dede S, Oto G, Alkan M (2003). The effect of *Nigella sativa* (black seed) and vitamin E + selenium in the prevention of liver necrosis experimentally induced carbon tetrachloride (CCL_4) in rats. Turk. J. Vet. Anim. Sci., 27:141-152.

SAS (2003). Statistical Analysis System. Institute Inc Carry North Carolina.

Sinovec ZJ, Rosanović RM (2006). Mitokoksini-pojava,efekti I prevenija, Fakulet veterinarske medicine, Beogard, 107-169.

Taweechaisupapong S, Aieamsaard J, Chistropas P, Khunkitti W (2012). Inhibitory Effect of Lemon grass oil and its Major constituents on Candida biofilm and Germ Tube Formation . South Afr. J. Bot.,81: 95-102.