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ORIGINAL RESEARCH ARTICLE

Carcass and Internal offal characteristics of broiler finisher chickens fed whole pearl millet *(Pennisetum glaucum L.)* based diets, supplemented with Detoxizyme® and phytogenics

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ABSTRACT

This research was carried out to evaluate the carcass and internal offals characteristics of Hubbard strain Broiler finisher birds fed whole pearl millet based diets supplemented with Detoxizyme® and phytogenics. One hundred and eighty birds were used in the study. There were five dietary treatments and each treatment was replicated four times. Treatment 1 served as the control diet without any additive (ginger, garlic or Detoxizyme®); Detoxizyme® 50g/100Kg diet (DT50), 500g garlic/100Kg diet (GR500), 500g/100Kg diet ginger (GG500) and mixture of 250g garlic and 250g ginger (GR250+GG250) were added as additives in treatments 2, 3, 4 and 5 respectively. The result of the carcass characteristics showed no significant differences across all the treatment means. Intestinal measurement revealed that only the length of the small intestine was different (P≤0.05) across the treatment means. Birds on 500g ginger/100Kg diet had lower (P≤0.05) length of small intestine. The non-significant differences among the various treatment means for the other internal offals characteristics suggests that the various additives at the levels fed in the broiler chickens' finisher diets had no adverse effects.

Keywords: Broiler Chicken, Pearl Millet, Detoxizyme ®, Garlic, Ginger

INTRODUCTION

Carcass weights reflect differences in weight gain and the fast-growing birds tend to have higher carcass weights than the slow-growing birds (Fanatico *et al*., 2008). It is difficult to give values for carcass yield and cut-up parts. The variables depend on feeding, breed and management at the farm. Detoxizyme®, garlic, ginger and garlic–ginger mixture were used in pearl millet based diets as additives to test the growth performance of Hubbard strain broiler finisher chickens (Mohammed *et al.*, 2014). Garlic is widely used and distributed in most parts of the world, because of its many beneficial properties. Garlic is rich in organo sulfur substances, such as allicin, diallyl sulfide, and diallyl trisulphide. The allicin gives garlic its characteristic odour and flavour as well as most of its biological properties (`Chowdury et al 2002). Phytochemicals of importance in ginger include: gingerol, gingerdiol, gingerdione, 6-dehydroshogoal, curcumene, zingiberence, β-phellandrene, β-sesquiphellandrene, camphene in various amounts according to the preparation process (Nanung, 2012). Garlic and Ginger has also been mentioned to have antimycotic effects (Kumar and Berwal, 1998).

Researches have been done using Garlic *(Allium sativum*), Ginger *(Zingiber officinale*) and lots of other phytogenics as feed additives in poultry diets. Supplementation of garlic in broiler chicken diet was reported to marginally improve weight gain and no effect was seen on the carcass characteristics except on the numerically lower abdominal fat (Onibi *et al*., 2009). Garlic powder was also reported to have no significant effect on broiler chickens weight gain, feed intake , feed conversion ratio , carcass cuts and visceral organs (Issa and Omar, 2012). Broiler chickens fed ginger at 5, 10 and 15g/kg diet were reported to have no significant difference with birds on the control diet in terms of feed intake, final weight and weight gain (Ademola *et al*., 2004). Most of these researches were done not using millet based diets. Pearl millet grains have in recent years been successfully used to wholly or partly replace maize as a major source of energy in poultry diets (Hidalgo et al., 2004). One of the major problems that could be encountered in using millet than other cereals is that, it is prone or more susceptible to fungal attack right from the field, during storage, and even when used to formulate diets (Davis *et al*., 2003). Even with the best quality control systems in the world, animal producers often find themselves with mycotoxin contaminated grain or feed (Jones *et al.*, 1994).

Detoxizyme®, a blend of specific natural toxin degrading enzymes on a toxin binding carrier has been used for eradication and prevention of mycotoxins. It has a double action effect of binding mycotoxins through its carrier Hydrated Sodium Calcium Alumino Silicate (HSCAS) and detoxifies and degrades mycotoxins through the specific action of its constituents enzymes when used at the

preventative level of 500g/tonne of feed (Animal Care, 2013). Other claimed benefits of Detoxizyme® are: - All the detoxifying enzymes (Epoxide reductase, Esterase, Peptidase and Hydrolase/Carbonyl reductase) present in Detoxizyme® improves livability, feed conversion ratio and weight gain in broiler chickens (Animal Care, 2013). Improvement in some growth performance parameters could cause an improvement in the carcass characteristics. Knowledge on the internal structures of chickens fed some particular feed additives could also give some clues on the physiological effects of such additives to the chickens. There is dearth of information on carcass and Internal offals characteristics on using feed additives especially Detoxizyme® and other Phytogenics on whole millet based diets used to feed poultry. This study therefore was aimed at determining the effects of Detozixyme®, garlic and ginger on the carcass and Internal offals characteristics of broiler finisher chickens fed whole pearl millet based diets.

MATERIALS AND METHODS

Experimental location

The experiment was carried out at the Poultry Production Section of Sokoto State Veterinary Centre located at Aliyu Jedo road in Sokoto metropolis.

Experimental diets

Five diets were formulated for the experiment. Diet one served as control (without additives). Diets 2, 3 and 4 contained 50g Detoxizyme ® (DT50), 500g garlic (GR500) and 500g ginger (GG500) per 100kg diet respectively. While diet five contained mixture of 250g garlic and 250g ginger (250GR+250GG) per 100kg diet. Table 1 shows the composition of the diets.

Experimental birds and general flock management

A total of 180 Hubbard broiler strain birds were used in a completely randomized design. The birds used were five weeks old and they were from a common source and feed. The birds were randomized and weighed in order to balance as close as possible the weights of each replicate.

Data collection

Two birds were randomly selected per replicate for carcass and Internal offals analyses. The birds selected were those whose weights were close to the average weight of the birds in the replicate (exactly the average weight per bird or ± 100g to the average weight). The birds were slaughtered by severing the jugular vein with sharp knife. Blood was as much as possible drained from the birds. Later scalding was done in which the birds were immersed in hot water at a temperature of 50-55^{0}c for 30-120 seconds. Immediately after scalding plucking was carried out by use of hand when the birds were still warm. After the plucking stabbing was done in order to remove the short feather stuff and the thin pin like feathers from the plucked carcass, all these were undertaken manually.

Table 1: Composition of the Broiler chickens' Finisher Diets

Ingredient(s)	Control	DT 50	GR500	GG500	GR250 + GG250
Millet	58.7	58.7	58.7	58.7	58.7
Wheat offal	4.0	4.0	4.0	4.0	4.0
Groundnut cake	33.0	33.0	33.0	33.0	33.0
Bone meal	2.3	2.3	2.3	2.3	2.3
Limestone	0.8	0.8	0.8	0.8	0.8
*V&M Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.35	0.35	0.35	0.35	0.35
Lysine	0.35	0.35	0.35	0.35	0.35
Total	100	100	100	100	100
Cost/kg diet(₦)	98.79	99.49	105.46	100.53	103
Calculated chemical analyses					
ME (kcal/kg)	3000	3000	3000	3000	3000
Crude protein %	22.10	22.10	22.10	22.10	22.10
Crude fibre %	6.69	6.69	6.69	6.69	6.69
Methionine %	0.62	0.62	0.62	0.62	0.62
Lysine %	1.13	1.13	1.13	1.13	1.13
Calcium %	1.21	1.21	1.21	1.21	1.21
AV. Phosphorus %	0.61	0.61	0.61	0.61	0.61
Ether extract %	4.47	4.47	4.47	4.47	4.47

*Animal Care Mineral and Vitamin Premix contained per Kg diet: Vit.A:12,0000 i.u; Vit.D3: 30000 i.u ; Vit.E:30mg; Vit.K3:2.5mg; Folic acid:1.0mg; Niacin:40mg; Calpan:10mg/kg; Vit. B2:5mg; Vit.B12:0.02mg; Vit.B1:2.0mg; Vit.B6:3.5mg; Biotin:0.08mg; Antioxidant:125mg; Cobalt:0.25mg; Selenium:0.25mg; Iodine:1.2mg/; Iron:40mg; Manganese:70mg; Copper8.0mg

Table 2: Carcass characteristics of broiler finisher chickens fed the experimental diets

Parameters	Control	DT50	GR500	GG500	GR250+ GG250	P	LOS
Live weight(g)	2075	1975	1900	1725	2000	0.06	NS
Dress weight (g)	1563.90	1484.10	1417.18	1287.85	1441.25	0.13	NS
Dressing Percentage	75.37	75.09	74.69	74.62	72.04	0.78	NS
Breast (%)	31.39	31.84	32.19	32.19	33.28	0.98	NS
Back (%)	13.46	13.50	12.63	12.76	12.79	0.93	NS
Thighs (%)	17.08	19.59	17.11	17.48	18.11	0.38	NS
Drumsticks (%)	13.88	13.53	13.48	13.13	13.12	0.99	NS
Wings (%)	11.34	10.32	11.63	11.71	13.10	0.22	NS
Neck (%)	7.29	6.68	7.46	7.27	7.74	0.64	NS
Liver (%)	2.92	2.64	2.65	2.39	3.04	0.41	NS
Gizzard–SSE(%)	2.65	2.67	2.85	3.25	2.83	0.25	NS

P= Probability value. LOS= Level of Significance. NS= No significant difference (P>0.05). SSE= Stratified Squamous Epithelial Layer.

Cutting was done by removing the head, shanks, neck, wings, drumsticks and the thighs, back, breast e.t.c. Evisceration was carried out by removing the internal organs. The carcass cut-up parts were weighed, also the internal organs like liver, pancreas, gall bladder, heart, kidney, spleen and lungs were weighed. In addition the gizzard was weighed after removing the contents in it as well as after removing the stratified squamous epithelial layer. The small and large intestines were all weighed and their lengths measured. The density (thickness) of both the small and large intestines was determined (Abdel-Fattah *et al.*, 2008). The carcass cut-up parts were expressed as percentage of dressed weight, whereas the internal offals characteristics were expressed as percentage of liveweight except for the length and density of the small and large intestines.

Statistical analyses

Data were subjected to analyses of variance (ANOVA) and Duncans Multiple Range Test (DMRT) was used to separate significant means (SAS, 2005).

RESULTS AND DISCUSSION

Results of carcass and offal characteristics are as shown in Tables 2 and 3. At week 8 there were no significant differences across all the treatment means in terms of the carcass characteristics. Birds on the control diet had numerically higher live weight and were followed by birds fed the garlic and ginger mixture. In terms of the dressed weight and dressing percentage, numerically higher weights were obtained from birds on the controlled diet and birds on the Detoxizyme® diet. Though there were some numerical differences among the cut-up parts, no

Table 3: Relative internal offals chracteristics of the broiler finisher chickens

Parameters	Control	DT50	GR500	GG500	GR250+ GG250	P	LOS
Live weight(g)	2075	1975	1900	1725	2000	0.06	NS
Intact Gizzard (%)	2.24	2.26	2.59	2.71	2.27	0.41	NS
Spleen (%)	0.13	0.09	0.09	0.10	0.16	0.32	NS
Pancrease (%)	0.20	0.18	0.17	0.16	0.20	0.87	NS
Gall bladder (%)	0.06	0.07	0.05	0.07	0.05	0.75	NS
Heart(%)	0.43	0.47	0.38	0.45	0.47	0.67	NS
Lungs(%)	0.57	0.61	0.57	0.63	0.60	0.95	NS
Kidneys(%)	0.29	0.32	0.30	0.26	0.42	0.24	NS
Liver (%)	2.18	1.97	1.97	1.79	2.27	0.30	NS
Small Intestine (%)	4.10	4.38	4.50	3.77	4.19	0.34	NS
Small Intestine(L-cm)	186.75^{ab}	201.38^{a}	190.38^{a}	168.50^{b}	200^{a}	0.03	*
Large Intestine (%)	0.83	0.77	0.92	0.77	0.81	0.76	NS
Large Intestine(L-cm)	30.63	28.25	28.75	27	28.93	0.44	NS
Abdominal Fat Pad (%)	2	1.86	2.14	1.89	1.55	0.64	NS
Small Intestine (D- g/cm)	0.46	0.43	0.45	0.39	0.42	0.27	NS
Large Intestine (D-g/cm)	0.56	0.53	0.61	0.49	0.55	0.56	NS

ab: means with different super scripts on the same row are significantly different (P≤0.05)=*. DT50= Detoxizyme 50g. GR500=Garlic 500g. GG500= Ginger 500g. P= Probability value. LOS= Level of Significance. NS= No significant difference (P>0.05). D-g/cm=Density in gramme per centimetre. L-cm= Length in centimeter.

specific trend was established. Onibi *et al*., (2009) fed raw garlic to broiler chickens and found no significant differences on the selected carcass and internal offals characteristics. Carcass yield was found to be higher ($P<0.05$) in broiler chickens supplemented with 0.75% aqueous extract of ginger (Fakhim *et al*., 2013). The internal offals characteristics revealed no significant differences ($P>0.05$) across all the treatment means for all the parameters analyzed, except for small intestine length in which birds on 500g ginger diet showed higher small intestine length but which was not different from the birds on the control diet, birds on Detoxizyme® and birds on 500g garlic. Birds on 500g ginger however had lower small intestine length but which was not different from the value obtained from birds on the control diet. Issa and Omar (2012) report revealed no significant differences in the relative weights of selective digestive organs of broiler chickens fed garlic as dietary additive. The study of Onibi *et al.* (2009) showed that carcass and organ characteristics of broiler chickens fed garlic at 500g per 100Kg diet revealed no significant ($P>0.05$) effect of garlic supplementation. Thus, supplementation of the diets with garlic promoted similar carcass development as the control diet.

The relative weights of the abdominal fat were numerically lowered for broilers fed supplemental dietary garlic ($P<0.05$) compared with those fed the control diet. Sarica *et al.,* (2005) used 100g per 100Kg diet ginger and 100g per 100Kg diet garlic and reported that basal (control) diet and garlic supplemented diet significantly increased ($P<0.05$) the length of the small intestine compared to other dietary treatments. Fakhim *et al*., (2013) reported no significant differences among the selected internal offals characteristics of broiler chickens at 8 weeks of age. The non-significant differences among all the other internal offals obtained in this study suggests that the additives fed were not toxic to the internal offals and also did not significantly affect the physiology of the offals as to cause hypertrophy or hypotrophy of any of the offals.

CONCLUSION

It was concluded that supplementation of dietary additives of Detoxizyme®, garlic, ginger and the mixture of garlic and ginger at the levels of inclusion used on broiler finisher chickens fed whole pearl millet based diets had no effect on the carcass characteristics and also no adverse effect on the internal offals was noticed.

CONFLICT OF INTEREST

We hereby declare that there are no competing interest issues in this manuscript.

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