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EFFECT OF WATER MELON (CITRILLUS LANATUS) SEED POWDER ON GROWTH PERFORMANCE PARAMETERS OF BROILER CHICKENS

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ABSTRACT

The effect of water melon seed powder (*Citrillus lanatus*) on the growth performance and carcass quality of chicken were investigated. 45 day old fidan broiler chicks were randomly distributed 15birds / dietary treatment and each treatment contained 3 replicate (5 bird/ replicate) over a period of 6 weeks. The vital feed starter and finisher diet were used during the experimental period respectively. The control group (A) diet was the commercial feed (Vital feed starter and finisher diet) without water melon seed supplementation. The diet of group (B) and group (C) contained supplementary water Melon seed powder of 20g and 30g diet respectively. The body weights and feed consumption was recorded at weekly intervals. Body weights and feed conversion ratio (FCR) were calculated. On 42nd day bird were slaughtered and the weight after bleeding, weight after defeathering, total organ weight and dressed weight of individual birds were measured. The carcass quality parameters such as abdominal (fat around gizzard, vent and heart and subcutaneous (neck, breast and leg) fat content of fire samples from each replicate were determined. The study revealed that 20g and 30g supplement significantly ($P<0.05$) improved the growth performance and carcass yield of broiler chicken compared to the control group. Between 20g and 30g water Melon seed powder, 20g was the most the effective in improving the growth performance of carcass quality broiler. Chicken the mortality rate was Zero (0) in the entire experimental groups. This study revealed that 20g inclusion rate of watermelon seed powder was found to be the beet and optimum inclusion rate, and this has beneficial effects on the growth performance and carcass yield or broiler chicken.

KEYWORD: *Citrillu Lanatus Seed, Body Weight Gain, Total Feed Intake and Carcass Characterization.*

INTRODUCTION

More emphasis than ever before is now placed on global food security. Poultry meat offers considerable potential for bridging the gap between supply and demand for animal protein especially in Africa. In this continent and other less developed nations, the low level or rate of supply of animal is due to the poor performance of livestock (Aletor, 2006), which has been attributed to factors such as inadequate nutrition, high price and poor quality of feeds and inefficiency in production and distribution in the feed industry (Tewe, 1997). It also worth nothing that several attempts have been made in this region to reduce feed cost while improving productivity of high meat yielding exotic poultry like broiler chickens. This include the use of agro-industrial by-products (Aletor, 2006), maggot meal (Awoniyi *et al.*, 2004), leafy vegetable protein concentrate (Agbede, and Aletor, 2003) and herbercious human haematinic (Adedapo *et al.*, 2002; Nworgu *et al.*, 2007). Apart from the inadequate supply and conception of animal protein, there has been a resurgence of interest in improving the physiochemical and sensory properties of meat as well as it storage life.

In pursuit of improved chicken healthiness and in order to fulfill consumer expectation in relation to quality poultry producers more and more commonly apply natural feeding supplement mainly herbs (Gardzielewska *et al.*, 2003). The positive effect of herbal supplements on broiler performance, carcass quality and quality trait of meat have been demonstrated (Schleicher *et al.*, 1998). Onibi *et al.*, (2006) reported the use of supplementary a-tocopheryl acetate in the diet of pig while increasing the concentration of vitamin (E) as well as oxidative stability of meat. A variety (*Citrillus lanatus*) of herbal supplements including watermelon which belongs to the family of *cucurbetaceae* have widely used to maintain and improve health of human (Giwa *et al.*, 2010). Patel *et al.*, (2012) reported watermelon as a plant with anti-diabetic, anticancer, antioxidant, immunomodulatory, anti-inflammatory and cardiovascular protecting effects.

Moreover watermelon seed is very rich in protein and unsaturated fats as well as most essential amino acid. They are also a good source of B-vitamins, iron, selenium, zinc and magnesium as well as other minerals. Giwa *et al.*, (2010) also reported that watermelon has strong anti-oxidative effects. Watermelon extract and/or watermelon components were able to prevent chemically induce tumuors or acute toxic effect of chemicals. The chemo-

preventive potential of watermelon is attributed to the present of several bioactive compounds found in the plant. This compound might act as antioxidants (Fanele *et al.*, 2008; Siegers *et al.*, 2009).

The antioxidative properties of water melon is as the result of the contribution of its bioactive components in different steps and not only one of them (Fanele *et al.*, 2008).

Watermelon also has shown to have high antimicrobial activity against *Escherichia coli, staphylococcus aureus* and others bacterial. Extract of watermelon fruits, leaves, roots and stem were also found to be potentially useful against many gram positive bacilli and fungi (Gurudeaban *et al.*, 2010). Finally, the watery juice obtained from this plant (*Citrillus lanatus*) is considered in many dry areas as a water substitute and despite the palatability of the plant *Citrillus lanatus* for humans, there is no study conducted in the practical usage of *Citrillus lanatus* seed as a natural feed stuff for animal production. There, it is against this background, that this study was conducted to evaluate the effect of *(Citrillus lanatus)* seed powder on the growth performance and carcass quality of broiler chicken.

MATERIALS AND METHODS

Experimental location: The research was conducted in the poultry unit of the animal house of in the Department of Genetics and Biotechnology of the University of Calabar, Calabar. During the time of the experiment, annual rainfall range between 1260mm to 1280mm. the day length average was 12 hours (Meteorological unit, Unical 2013). The stocking density of the experimental site was (5) birds per square meter to avoid overcrowding. The site was also provided with lighting source as lighting has an effect on feed consumption (Oluyemi and Robert, 2002). And this experiment lasted for six (6) weeks.

Experimental animal

The birds used for the research were procured from the distributor of vital feed and supplier of day old chick in Calabar, at No. 68/84 Mount Zion Road by Atamunu Junction, Calabar. A total number of 45 day old commercial broilers, comprising of a single strain of broiler chicks of the same uniform age.

Preparation of *Citrillu lanatus* seed powder

The *Citrillus lanatus* seeds were obtained from the *Citrillus lanatus* fruit (watermelon) and rinsed it thoroughly with water to reduce excess pulp. It was air seeds dried at room

temperature for seven days. The seed was pulverized into fine powder using a domestic electric mill and the powdered material were added to the broiler feed according to the treatment levels. The forty five (45) day old broiler procured for the experiment were completely randomize into three (3) treatment groups A, B and C, with 15 birds in each group. Group A was the control group while group B and C were the treatment groups. Group A as the control were fed with commercial diet (vital feed started and finisher) with 0% inclusion of *Citrillus lanatus* seed powder. Group B birds were fed with vital feed + 20% inclusion of *Citrillus lanatus* seed powder. For group C birds, their feed was vital feed with 30% inclusion of *Citrillus lanatus* seed powder. And the administration of this experimental treatment lasted for six (6) weeks. During the feeding period, diet and water were provided *ad libitum* where as the lighting regimen was 15 hours or continuous light per day. At the beginning of the experiment the birds were weighed, and at interval of one (1) week until the end of the experiment. At the growth phase, growth parameters, such as feed intake, body weight gain, feed conversion ratio and mortality rate were monitored weekly and recorded. At the end of the experiment (6 weeks), the birds were fasted for 12 hours and then weighed to determine the final body weight and after that, five (5) birds per group were slaughtered to analyze carcass qualities.

Carcass characteristics

The birds were slaughtered at 42nd day after withdrawal of feed 12 hours before slaughtering. The live body weight (LBW) of birds were recorded. The birds were slaughtered by cutting the jugular vein and after complete bleeding, the weight were recorded. The birds were then defeathered and eviscerated. Respective bird's weight and the weight of eviscerated gut and organs were measured. Finally, the dressed weight of birds were measured after removing head and shank. At the end of the slaughtering process, the carcass quality parameters such as abdominal fat content (fat around gizzard, vent and heart), subcutaneous fat content (clavico-cervical (neck), pectoral-lateral thoracic (breast), sartorial femoral (leg) were measured using five samples from each replicate (fifteen birds per treatment). Illustration of the main subcutaneous fat depots has shown in fig. 6.

Study parameters of growth performance

The following parameters were evaluated in growth performance phase:

i. Feed intake (FI)
ii. Body weight gain (BWG)

iii. Feed conversion ratio (FCR)

iv. Mortality rate (MR).

Feed intake (FI)

Total feed gain and left over feed were used to determine feed intake according to Macicjowski and Zeiba, 1982) by using the formulae (FID=FGD FLD=FI). Feed intake daily=total gain-feed left over.

Body weight gain (BWG)

Body weight gain was determine by the ratio of average final weight minus average initial weight multiplied by hundred (100) and divided by two (2) according to (Macicjowski and Zeiba, 1982)

Body weight (BW): $T=\frac{W_2-W_1}{2}x100$

Where T = Growth rate per week 90%

W_1 = Initial weight for stated weeks

W_2 = Final weight for stated weeks

Feed conversion ratio (FCR): Feed conversion ratio was determine by the ratio of feed consumption per unit increase in weight gain, according to Essien (1989).

Feed conversion ratio: $\frac{\text{Weight gain}}{\text{Feed intake weekly}} \times 100$

Mortality rate (MR): Mortality rate was determined according to Tayo (2005). Where he calculated mortality as the rate or the numbers of birds dead multiplied by hundred (100) divided by opening stock plus the closing stock of birds multiplied by 0.5. i.e.

Mortality rate: $\frac{\text{The number of birds dead x 100}}{\text{Opening stock + closing of birds x 0.5}}$

RESULTS

The results of the effect of inclusion of *C. lanatus* seeds in broiler feed is presented below. Table 1 shows the total feed intake after 6 weeks treatment with *C. lanatus* seed powder, table 2 shows total body weight gain after six week treatment with *C. lanatus*, table 3 shows total feed conversion ratio after six week treatment with *C. lanatus*, table 4 shows the mean values of the growth performance studied parameters, table 5 show the main value of Carcass

quality studied parameters. While figure 5 is the bar chart presentation of the effect of *C. lanatus* seed inclusion in broilers diet on the body weight gain, feed intake and feed conversion ratio of the birds. The performance parameters are presented in Table 4:

Table 1: Total feed intake after six week treatment with *C. lanatus.*

Replicate	Group(A)	Group(B)	Group(C)
1	3.109	2.948	3.052
2	4.733	4.471	4.669
3	6.821	6.558	6.668
4	9.085	8.551	8.924
5	13.817	13.620	13.722
6	17.405	15.810	16.400
Total	**54.970**	**51.958**	**53.435**
Mean	**9.162**	**8.659**	**8.906**

Table 2: For body weight gain after six week Treatment with *c. Lanatus*.

Replicates	GROUP (A)	Group(B)	Group(C)
1	1.50	1.58	1.55
2	1.45	1.54	1.49
3	1.35	1.51	1.46
4	1.54	1.56	1.54
5	1.40	1.41	1.39
6	1.40	1.46	1.43
7	1.56	1.55	1.54
8	1.50	1.58	1.51
9	1.45	1.46	1.55
10	1.49	1.50	1.49
11	1.44	1.53	1.46
12	1.43	1.44	1.47
13	1.36	1.46	1.46
14	1.36	1.51	1.38
15	1.36	1.64	1.36
Total	21.59	22.73	22.08
Mean	1.440	1.520	1.470

Table 3: Total feed conversion ratio after six week treatment with *c. lanatus.*

Replicate	Group(A)	Group(B)	Group(C)
1	2.73	3l5	2.99
2	2.71	3.05	2.87
3	2.53	2.98	2.80
4	2.87	3.08	2.97
5	2.59	2.78	2.69
6	2.62	2.89	2.77
7	2.91	3.07	2.95
8	2.79	3.10	2.91
9	2.69	2.89	2.98
10	2.78	2.86	2.88
11	2.70	3.02	2.80
12	2.69	2.85	2.81
13	2.54	2.90	2.81
14	2.55	2.69	2.65
15	2.58	2.72	2.62
Total	**40.28**	**44.03**	**42.50**
Mean	**2.69**	**2.94**	**2.83**

Table 4: Overall performances results affect by feeding *Citrilluslanatus* powder (watermelon).

Parameter ±SE*	Treatments			
	Control	B=20%	C=30%	Level of sign
Total feed intake (kg)	9.162 ± 2.25^{a}	8.659 ± 2.08^{ab}	8.906 ± 2.13^{b}	*
Total weight gain (kg)	1.440 ± 0.080^{b}	1.520 ± 0.0161^{a}	1.470 ± 0.0159^{b}	*
Total feed conversion (kg)	2.69 ± 0.0305^{c}	2.94 ± 0.0370^{a}	2.83 ± 0.0304^{b}	*
Mortality %	000	000	000	Ns

Means with different superscripts are significant different.

Table 5: Effect of water melon (*Citrillus lanatus*) seed powder on the carcass characteristic of broiler chicken.

Parameter	Treatments			
	Control	B=20%	C=30%	Level of sign
Live weight (kg)	1.348 ± 0.079^{c}	1.566 ± 0.060^{a}	1.466 ± 0.088^{b}	*
Dressing %	69.68 ± 1.8^{c}	79.75 ± 1.2^{a}	71.29 ± 1.3^{b}	*
Weight after bleeding (kg)	1.012 ± 14.6^{c}	1.268 ± 10.5^{a}	1.180 ± 12.8^{b}	*
Weight after defeathering (kg)	9.72 ± 14.4^{c}	1.238 ± 10.8^{a}	1.129 ± 12.6^{b}	*
Total organ weight (% LBW)	13.07 ± 1.04^{b}	14.60 ± 1.30^{a}	12.96 ± 1.12^{bc}	*
Abdominal fat (% carcass weight)				
Gizzard	$0.73\pm0.64^{ab*}$	0.88 ± 0.52^{a}	0.65 ± 0.53^{b}	*
Heart	0.11 ± 0.03^{b}	0.14 ± 0.27^{a}	0.09 ± 0.20^{c}	*
Vent	1.52 ± 0.84^{b}	1.71 ± 0.73^{a}	1.52 ± 0.78^{bc}	*
Subcutaneous fat (% carcass weight)				
Neck	0.82 ± 0.65^{c}	0.99 ± 0.55^{a}	0.86 ± 0.54^{bc}	*
Breast	0.30 ± 0.37^{b}	0.41 ± 0.25^{a}	0.28 ± 0.39^{bc}	*
Leg	0.76 ± 0.56^{b}	0.89 ± 0.41^{a}	0.67 ± 0.54^{c}	*

Means with different superscripts are significant different.

DISCUSSION

This study which was designed to evaluate the effect of watermelon *(Citrillus lanatus)* seed powder on growth performance parameters of broiler chickens shows that the feed intake, body weight gain and feed conversion ratio among the treatment diets was significantly ($p<0.05$) different with group A (control) having the highest value in mean. One would expect group A to have the highest body weight gain percentage values, but group B with 20% watermelon seed powder which has the highest body weight percentage value with low average feed intake, appears to be the best in terms of feed efficiency.

The total body weight gain shows a significant ($p<0.05$) different among the treatment groups. The dietary containing 20% watermelon seed powder will be more preferred by commercial farmers as the best and optimum inclusion rate in growth performance. As the result of increase in body weight, the demand by consumers will be higher than the bird that raised without the inclusion of watermelon seed powder in their feeds. However, the feed conversion ratio of the dietary sources contain 20% watermelon seed powder should significant ($p<0.05$) difference. Consumers and producers will best demand birds raised with the feed supplemented with the inclusion of 20% watermelon seed powder with lowest value, as the bird in this group possesses the best external qualities. Dietary watermelon seed powder *(Citrillus lanatus)* supplementation showed a significant ($p<0.05$) influence in the growth performance and carcass quality parameters of the chicken kept on a diet containing 20% watermelon seed powder.

This observation agrees with the results of Tekeli *et al*, (2006) which was reported that another plant extract contribution *(Z. Officinale* 122ppm) such as water melon seed powder improved live weight gain, feed intake and feed conversion ratio of broiler also increased population of intestinal lactic acid bacteria. The improvement of feed intake and feed conversion ratio might be due to lower ($p<0.05$) feed intake and improved weight gain live body. Weight gain shows improvement and was statistically significant ($p<0.05$) by the inclusion of watermelon seed powder. These results might also be due to the good health status which may be cause by the inclusion of watermelon seed powder. It was reported by Williamson *et al* (2009), that including water melon extract in the laying, hens, watermelon inclusion resulted in increased TWBC which reflecting good immune response. It was also reported that water melon plant extract decreases external parasites by inhibiting of its growth

(Sainsbury, 2010).

Result from the present study indicated that feeding broiler with water melon *{Citrillus lanatus)* seed powder supplemented diet had beneficial effects on the growth performances such as (body weight gain, feed intake, and feed conversion ratio) without affecting livability. This wonder seed of watermelon also shows good yield in carcass quality parameters of broilers chicken. There was a consistent improvement in body weight gain, feed conversion ratio and feed intake for all experimental additives throughout the experimental period in comparison with unsupplement control treatment.

Observably, more benefit was pronounced for the birds with diet contain 20% *Citrillus lanatus* seed powder, regarding to body weight gain and carcass yield, and this was statistically significant from other experimental group. The beneficial effect of feed intake and feed conversion ratio is due to lower ($p<0.05$) feed intake and improved weight gain live body. The results of the present study in live body weight gain were in agreement with that reported by Sumiyoshi (1997) and Oluwole (2001). In addition to that improved broiler performance might be due to watermelon nutritional composition (Patel *et al, 2012).* In the present study, the 20% inclusion rate of watermelon seed powder was found to be the best and optimum inclusion rate in growth performance. The study also revealed no mortality in all the treatment diets.

CONCLUSION

In conclusion, watermelon seed powder in broiler chicks feed resulted in a significant positive effect on broiler chick's growth performance. The optimum inclusion rate of watermelon seed powder for growth performance was found to be 20%. Further studies in the area of the effect of watermelon seed powder inclusion on growth performance are recommended.

Recommendation: Profit maximization, 20% dietary sources of watermelon seed powder is preferred since the body weight gain is one of the factors to consider for any successful broiler producing firm.

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