NSUK Journal of Science & Technology, Vol. 6: No. 2. 2016. pp. 55 -57 ISSN: 1597- 5527

EFFECT OF DIETARY LEVELS OF TOASTED WATERMELON (*CITRULLUS LANATUS*, THUMB) SEED MEAL FOR SOYABEAN ON CARCASS AND INTERNAL ORGAN CHARACTERISTICS OF BROILER CHICKENS

***LAKURBE, O. A. AND DOMA, U. D.**

Department of Animal Science, Faculty of Agriculture, Federal University, Kashere, Nigeria.

[1]Department of Animal Production, Faculty of Agriculture and Agricultural Technology, A.T.B.U., Bauchi, Nigeria.

***Corresponding Author: auduobedtb@gmail.com**

ABSTRACT

A seven-week feeding trial was conducted with two hundred unsexed day-old Anak broilers was carried out to evaluate the effect of graded levels of toasted watermelon seed (WMSF) on carcass and internal organ characteristics of broilers. The proximate composition showed that toasted watermelon seed is rich in crude protein (34.78%) and ether extract (24.90%). Five experimental diets were formulated in which toasted WMSF replaced soyabean at 0, 10, 20, 30 and 40% tagged as diets 1, 2, 3, 4 and 5 respectively for both starter and finisher rations. The day-old chicks were randomly allotted to the dietary treatments with four replications each and 10 birds per replicate in a completely randomized design (CRD). At the end of the experiment two birds per replicate were randomly selected for carcass yield and organ characteristics. Most of carcass parameters measured were not affected except for eviscerated weight (1.18-1.56kg; $P<0.05$), heart weight, large intestine length and pancreas weight ($P<0.01$) as well as the weights of lungs, liver, kidney, large intestine and gizzard ($P<0.01$), though no definite pattern was observed. It can be concluded that inclusion of toasted WMSF in broiler diets at 30% has no adverse effects on the carcass yield and organ characteristics.

Keywords: Broilers, Carcass Characteristics, Dietary treatment, Toasted, Watermelon seed.

INTRODUCTION

The rising cost of poultry feeds has continued to be a major challenge confronting the poultry industry in Nigeria. This is because feed accounts for 65 to 75% of the total cost of production (Nworgu *et al*., 1999).Over dependence on conventional legume seeds such as soya bean and groundnut as plant protein sources has affected their availability and affordability, especially for non-ruminant animals such as poultry. Therefore, efforts are being channelled towards the use of non-conventional feedstuffs available locally. According to Nwokolo (1986) these alternatives should have comparative nutritive values comparable to the conventional ones as well as lower price.

Watermelon (*Citrullus lanatus* Thumb) as a tropical crop is extensively cultivated throughout northern Nigeria (Oji *et al*., 1999) mainly for its fruits which is used as a dessert. The seed is a rich source of protein and energy. It is also cheap and readily available that may reduce feed cost. Watermelon seed may be used as source of protein because, it has crude protein (%CP) content of 32.5-38.7% (Oyenuga and Fetuga, 1975) and it is readily digestible and its biological value and efficiency of utilization were observed to be inferior only to those of animal proteins, although it's low in an essential amino acid lysine (Oyenuga, 1978). Watermelon may also supply energy because it's rich in oil content (51-55%) (Oyenuga and Fetuga, 1975, Al-khalifa,1996).Processing water melon seed before inclusion in to broiler diets was observed to make the protein in the diet more available and well utilized by the broilers (Oloyede *et al*., 2004). This study evaluated the carcass and internal organ characteristics of broilers fed toasted full-fat watermelon seed (WMSF) based diets.

MATERIALS AND METHODS

The experiment was carried out at the Animal Production Research Farm, Abubakar Tafawa Balewa University, Bauchi, Nigera. The watermelon seeds was purchased from local farmers and then winnowed to remove grits and dirt. Toasting was carried out by spreading the seeds thinly in frying pan and placed over heat from firewood. It was stirred continuously to achieve uniform heating/ toasting, adequate toasting was then achieved when the seeds became crispy to touch. The toasted seeds were then ground to powder and samples analyzed for nutritive values according to AOAC techniques (AOAC, 1990).

Two hundred (200) day-old Anak broiler chicks were brooded together for 1 week and randomly allotted to five treatment diets which were replicated four times in a completely randomized design (CRD) of 10 birds per replicate. The experiment lasted for 49 days (7 weeks), feed and water were supplied to the birds *ad lib*. Five experimental diets for both starter and finisher birds were formulated in which toasted watermelon seed partially replaced soya bean at 0, 10, 20, 30 and 40% which was tagged as diets 1, 2, 3, 4 and 5, respectively.

At the end of the experimental period, 2 birds per replicate were randomly selected (i.e.40 birds), fasted for 12 hours before slaughter. The live weights and weights of carcass and internal organs were measured. Data obtained from these parameters were analyzed using analysis of variance techniques as described by Steel and Torrie, (1980). Differences between treatment means were separated using Duncan Multiple Range Test (DMRT) (Duncan, 1955).

RESULTS AND DISCUSSION

The chemical analysis of watermelon seed used in the present study is presented in Table 1.

Table 1: Proximate composition of toasted watermelon seed

Nutrients	%
Crude Protein	34.78
Crude Fibre	6.26
Ether Extracts	24.90
Ash	2.51
Nitrogen free Extracts	31.55

The results showed that watermelon seed had a crude protein content of 34.78 %. The value obtained was in line with values reported previously by Oyenuga (1978) who observed that water melon seed had a crude protein of 32.50-38.70%. There is however, variation with the reports

of another researcher Shazali *et al*. (2013) who reported 27.7%, although, these differences could be as a result of difference varieties, area of production and or agronomic practices. The result also showed that WMSF had fibre content of 6.26%, which is close to the findings of Oyenuga and Fetuga (1975) who reported fibre content of watermelon seed to be 5.90%.

The values obtained on carcass and internal organs of broilers fed graded levels of water melon seed based diets is shown in Table 4. The results showed that there was no significant (P>0.05) difference among the treatment means in live weight and dressing percentage, the highest live weight was diet 4 (1.80 kg) while diet 5 had the lowest value (1.60 kg) and the best dressing percent was diet 3 (71.46) and least diet 5 (66.82). Furthermore, a highly significant (P<0.001) difference in percent gizzard weight, lungs weight, heart weight and kidney weight was observed, with treatment diets containing WMSF having higher values than the control diet. Although, the reasons for these were not clear, but it could be attributed to the corresponding increase in fibre content of the diets as a result of inclusion of full-fat watermelon seed which could be responsible for the hypertrophy of these organs in response to the diets fed. The increase in intestinal lengths and weights observed among watermelon seed based diets as compared with the control is expected because of its fibrous nature. This is in agreement with the findings of Adrizal and Ohtani (2002) who reported that at similar feed intake fibrous diets increase weights and lengths of the gastrointestinal tract (GIT) of broiler chickens. More so, an increase in gizzard weights among watermelon based diets than the control diet showed an indication of high fibre as a result of the watermelon seed inclusion and this is in agreement with the result of Oyawoye and Nelson (1999) who reported that the size of the gizzard increases as the dietary levels of fibre increase.

Table 2: Percentage composition of the experimental diets fed to broilers at the starter phase (1-4 weeks)

	Replacement Level of WMSM for Soyabean (%)				
Ingredients	(0)	(10)	(20)	(30)	(40)
Maize	38.33	38.33	38.33	38.33	38.33
Soya bean (FF)	40.97	36.87	32.78	28.68	24.58
Water melon (FF)	0.00	4.10	8.19	12.29	16.39
Wheat offal	13.00	13.00	13.00	13.00	13.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Bone meal	3.00	3.00	3.00	3.00	3.00
+Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Calculated Analysis					
Crude Protein (%)	23.42	23.21	23.01	22.80	22.59
ME (Kcal./kg)	3025.00	3033.20	3041.38	3049.58	3057.78
Crude Fibre (%)	4.88	4.96	5.05	5.15	5.26
Ca (%)	1.47	1.46	1.46	1.45	1.33
Total P (%)	0.80	0.78	0.81	0.84	0.87

+A bio-organics nutrient supplement containing Vit. A; 4000000 I.U,Vit. D3; 800000 I.U, Vit. E; 9200mg; Niacin 11000 mg; Vit. B2 2000 mg; Vit. B6, 1200 mg; Vit. B12 6mg; Vit. K3 800 mg; Pantothenic acid 3000 mg; Biotin 24 mg; Folic acid 300 mg; Choline Chloride 120000mg; Cobalt 80 mg; Copper 1200mg; Iodine 400 mg; Iron 8000 mg; Manganese 16000 mg; Selenium 80 mg; Zinc 12000 mg; Anti-oxidant 500 mg.

Table 3: Percentage composition of the experimental diets fed to broilers at the finisher phase (5-8 weeks)

	Replacement Level of WMSM for Soya bean (%)				
Ingredients	(0)	(10)	(20)	(30)	(40)
Maize	41.16	41.16	41.16	41.16	41.16
Soya bean (FF)	33.14	34.33	30.51	26.70	22.88
Water melon (FF)	0.00	3.81	7.63	11.44	15.26
Wheat offal	15.00	15.00	15.00	15.00	15.00
Fish meal	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
+Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Calculated Analysis					
Crude Protein (%)	20.72	20.47	20.28	20.09	20.09
ME (Kcal./kg)	3008.93	3016.55	3024.19	3031.81	3039.45
Crude Fibre (%)	4.99	5.07	5.15	5.24	5.34
Ca (%)	1.28	1.34	1.33	1.33	1.33
P (%)	0.72	0.74	0.74	0.75	0.75

+Premix: A bio-organics nutrient supplement containing Vit. A 3600000 I.U; Vit. D3 600000 I.U; Vit.E 4000 mg;Biotin H-2 300 mg; Vit. B1 640 mg;Vit.B2 1600 mg; Vit. K3 600 mg;Pantothenic acid 2000 mg; Folic acid 200 mg;Cholin Chloride 70000 mg; Cobalt 80 mg; Copper 1200 mg; Iodine 400 mg; Iron 8000 mg; Manganese 16000 mg; Selenium 80 mg; Zinc 12000 mg; Anti-oxidants.

Table 4: Carcass and organ characteristics of broilers fed experimental diets

Parameters	(0)	(10)	(20)	(30)	(40)	SEM
Live weight (kg)	1.73	1.79	1.70	1.80	1.60	0.09NS
Plucked weight (kg)	1.56	1.66	1.61	1.61	1.46	0.08NS
Evicerated weight (kg)	1.52[a]	1.56[a]	1.34[b]	1.36[b]	1.18[b]	0.08*
Carcass weight (kg)	1.17	1.25	1.22	1.24	1.08	0.07 NS
Dressing Percentage	67.66	69.29	71.46	68.72	66.82	1.48 NS
Heart weight (%)	0.38[b]	0.60[a]	0.55[a]	0.50[a]	0.50[a]	0.04 **
Liver weight (%)	1.29[c]	2.11[a]	2.10[a]	1.92[a]	1.65[b]	0.13 **
Kidney weight (%)	0.16[b]	0.27[a]	0.34[a]	0.30[a]	0.19[b]	0.03 **
Abdominal fat (%)	1.06	1.22	1.41	1.28	1.34	0.19 NS
Gizzard weight (%)	1.63[b]	2.59[a]	2.93[a]	2.47[a]	2.81[a]	0.13 **
Caecal weight (%)	0.40	0.49	0.53	0.50	0.46	0.04 NS
Pancreas weight (%)	0.22[c]	0.31[a]	0.35[a]	0.26[b]	0.30[b]	0.02 **
Large intestine weight (%)	0.25[a]	0.17[b]	0.15[b]	0.18[b]	0.38[a]	0.04 **
Spleen weight (%)	0.09	0.18	0.17	0.19	0.12	0.03 NS

[abc]Means bearing different superscripts within the same row differ (*=P<0.05, **=P<0.01), NS=Not Significant, SEM=Standard Error of Mean.

CONCLUSION

The present study investigated the effect of replacing toasted water melon seed for soya bean on the carcass and organ characteristics of broilers. Thus, from the results obtained it can be observed that when properly processed in order to eliminate anti-nutrients present in the oil seed, water melon can safely and effectively be utilized to replace the costly soya bean to up to 30% in the diets of broilers without depressing carcass development.

REFERENCES

Adrizal and Ohtani, S. (2002). Effects of rice bran non-starch polysaccharides and fibre-degrading enzymes on the performance and nutrient digestibility in broiler chicks; *Journal of poultry science*. 39(2): 107-109.

Al-Khalifa (1996). Physiochemical characteristics, fatty acid composition and lipoxygenase activity of crude pumpkin and melon seed oils. *Journal of Agriculture Food Chemistry*, 44: 964-966.

AOAC, (1990). Official Methods of Analysis. Association of Official Chemists.11th Edition, Washington D.C

Duncan, D. B. (1955). Multiple Range and Multiple F Tests Biometrics, 11:1-42.

Nwokolo, E. (1986). Growth and organ weights of chicks fed on processed pigeon pea (*Cajanus cajan*) meal supplemented with lysine and methionine. *Nigerian Journal of Nutritional Science*. 7: 78-80.

Nworgu, F. C., Adebowale, E. A., Oreiden, O.A. and Oni, A. (1999). Prospects and economics of broiler production using two plant protein sources. *Tropical Journal Animal Science*, 2(1): 159-166

Oji, U. I.,Oruwari, B. M. and Iwuagila, R. O.,(1999). Performance of growing broiler chickens fed toasted and untoasted melon (*Colocynthis citrullus*) seed meal. *Tropical Journal of Animal Science*, 1: 43-49.

Oloyede, B. O., Otunola, G. A., and Apata, D. F. (2004). Assessment of protein quality of processed melon seed as a component of poultry feed. *BIO-KEMISTRI*, 16(2): 80-87.

Oyawoye, E. O. and Nelson, F. S. (1999).Optimum level of inclusion of rice offal in the diet of young cockerel. Proceedings of the 26th Annual Conference of Nigerian Society for Animal Production, 21-25th March, Ilorin.

Oyenuga, V. A. (1978). Nigerian Foods and Feedingstuffs. Their Chemistry and Nutritive Values. Ibadan University Press. Ibadan Pp 8-16:86-89.

Oyenuga, V. A.,and Fetuga B. L., (1975). Some aspects of the biochemistry and nutritive value of the water melon (*Citrullus vulgaris*, Schrad). *Journal of Science Food Agriculture*, 26: 843-854.

Steel, R. G. O. and Torrie, J. H.,(1980). Principles and Procedures of Statistics.McGraw Hill Book Company Inc. London.

Shazali, H. S.,Zubeir, E. A. and Abdelhadi, O. M. A. (2013). The effects of feeding water melon seed meal and full-fat seed on broiler chick growth. *Iranian Journal of Applied Science*, 3: 279-282.