Journal of Agriculture, Environmental Resources and Management

Journal of Agriculture, Environmental Resources and Management
ISSN2245-1800(paper) ISSN 2245-2943(online)
6(1)1-800; **JAN**.2024; pp134-139

www.saerem.com

Effect of replacing watermelon peel meal with wheat offal in broiler starter diets on carcass and organs weight characteristics

[1]Dabai, S.A. [2]Bello, S., [2]Ribah, M.I., [2]Senchi, M.H., [1]I.M Harande., and [3]I. Hamisu

[1]*Department of Animal Science, College of Agriculture, Federal University of Agriculture Zuru, PMB, 28 Zuru, Nigeria.*
[2]*Department of Animal Science, Faculty of Agriculture, Kebbi State University of Science and Technology, PMB 1144, Aliero, Nigeria.*
[3]*Department of Biology, School of Science, Adamu Augie College of Education P.M.B 1012, Argungu Kebbi State – Nigeria.*

Corresponding author: saidualiyudabai2014@gmail.com;

Abstract
The demands for broiler meat is increasing due to population whereas production cost of such meat has remained high due to high cost of convectional feed. Carcass and organ weight characteristics of ninety-six (96) 2-weeks old broiler birds fed dried watermelon peel meal was investigated. Watermelon peel meal was included at 0, 1.25, 2.5 and 3.75% dietary inclusion levels as replacement for wheat offal to form (Diet 1, Diet 2, Diet 3 and Diet 4 respectively). The birds were randomly allocated to four treatment groups replicated thrice to have 8 birds per replicate, and were fed the experimental diets ad libitum for 4 weeks under a deep litter management system. At day 28, one bird replicate was slaughtered for the evaluation of carcass and organs weight characteristics. There were no significant (P>0.05) differences in live weight, carcass weight, dressing %, thigh, shank, wing and neck. Significantly (P<0.05) higher breast muscle of 109.67g/bird was recorded on birds fed 3.75% DWMP compared to other groups. For the organs weight, no significant effect on liver, heart, lung, intestine, pancreas and gizzard (P>0.05). Based on the carcass and organs weight characteristics of birds, dried watermelon meal can be included up to 3.75% in the diet of birds at the starter phase without any harmful effect on their carcass and organs.

Keywords: Carcass, Characteristics, Broilers, Watermelon

Description of problem: The processing of watermelon fruits into juice for human consumption has made peel abundantly available particularly in northern part of Nigeria. This product account for nearly 30% of total watermelon weight (Romella, Rani and Manohar, 2016). Watermelon peel is a waste with no economic value and possibly harming the environment if not properly handled (Dias, Sajiwanie and Rathnayaka, 2020). Studies have shown that peels of watermelon are rich in nutrients (including dietary fiber, vitamins and minerals), phytochemicals, antioxidants, and antifungal and antimicrobial compounds which are beneficial for poultry growth and health (Gladvin, Sudhaakr and Swathi, 2017; Alagbe, 2018; Dias et al., 2020; Neglo, Tetteu, Essuman, Kortei, Boakye, Hunkpe, Amarh, Kwashie and Devi, 2021; Otu, Banjo, Kolo, Balogun and Dabban, 2021. Nguyen et al. (2019) reported that watermelon peel mash diet could be used as a natural source of L-Citruline in chicks to ameliorate the adverse effects of heat stress. Furthermore, replacement value of wheat offal with maize, which is used conventionally in the diet of

chicken, has become scarce, expensive and competitive food and industrial raw materials. In recent years however, prices of wheat offal has increased which forced poultry farmers to use other fibre sources to replace the wheat offal in the diet of broilers chickens. Among such alternatives is the use of watermelon peel which is found abundant in nutrients. It is in this background that the current research was designed to studies the effect of replacing watermelon peel meal with wheat offal in broiler finisher diets.

Materials and Methods: Study site: This study was conducted at the poultry research unit of the Animal Science Department, Kebbi State University of Science and Technology, Aliero (KSUSTA). The area (latitude 12°16′42”N and longitude 4°7”E) was located in the Southeast of Kebbi (KSUSTAM, 2021). It has a total of one hundred and twenty-five thousand seven hundred and eighty-three people (125,783) (NPC, 2006). The area is located in the Southeast part of Kebbi State.

Collection and processing: Fresh watermelon peels were collected from Aliero market. The peels were cleaned, carefully scraped to minimize the inclusion of inner layer or spongy white tissue, sliced at 2 cm and air-dried for 4 days (96 hours). The air-dried peels were ground using pestle and mortar to obtain a meal.

Birds, diets and design: Ninety-six (96) broiler birds at 2 weeks of age were allocated to four experimental diets using completely randomized design. Each treatment had twenty-four (24) starter broiler chicks, replicated thrice with eight (8) birds per replicate. Watermelon peel meal was included at 0, 1.25, 2.5 and 3.75% dietary inclusion levels as replacement for wheat offal to form (Diet 1, Diet 2, Diet 3 and Diet 4) respectively. The composition of experimental diets is presented in Table 1.

Table 1. Composition of the experimental diet for broiler starter birds

Ingredients	Diet 1 (0%)	Diet 2 (1.25%)	Diet 3 (2.5%)	Diet 4 (3.75%)
Maize	50.71	50.67	50.54	50.95
GNC	35.79	35.83	35.96	35.55
Wheat offal	5.00	3.75	2.50	1.25
WPM	0.00	1.25	2.50	3.75
Blood meal	3.50	3.50	3.50	3.50
Bone meal	1.00	1.00	1.00	1.00
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
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated value				
CP (%)	24.25	24.07	23.92	23.48
ME (Kcal/kg)	2808.24	2792.12	2274.92	2763.30
CF (%)	3.47	3.36	3.22	3.10
EE (%)	5.59	5.74	5.46	5.37
Calcium (%)	0.37	0.33	0.33	0.32
Phosphorus (%)	0.47	0.73	0.46	0.45

KEY: CP=crude protein, ME=metabolizable energy, CF=crude fibre, EE=ether extract

Carcass evaluation: At day 28, one bird per replicate were r;andomly selected and slaughtered to obtained the relative weights of the carcass and organs. The birds OOwere

defeathered and eviscerated manually after slaughter. The eviscerated birds were dissected and all internal organs and external offals (head, shank and neck) were carefully removed. The dressing percentage was calculated using the formula.

$$Dressing\ \% = \frac{Carcass\ weight}{Live\ weight} \times 100$$

Data analysis: The data collected was subjected to Analysis of Variance (ANOVA) using SPSS. Means separation was carried out using Least Significant Difference (LSD) as outlined by Steel and Torries (1980).

Results and Discussion

Table 2: Carcass characteristics of broiler starter birds fed DWPM

	TREATMENTS				
PARAMETERS	**Diet 1 (0%)**	**Diet 2 (1.25%)**	**Diet 3 (2.5%)**	**Diet 4 (3.75%)**	**SEM**
Live weight (g)	666.67	700.00	766.67	800.00	84.984
Carcass weight (g)	633.33	683.33	733.33	800.00	77.728
Dressing (%)	95.54	97.62	96.06	100.00	1.912
Breast muscle (g)	98.13^{ab}	57.13^{b}	98.70^{ab}	109.67^{a}	10.326
Thigh (g)	128.57	88.43	131.37	132.53	13.321
Shank (g)	24.03	29.37	33.73	34.27	4.570
Neck (g)	71.00	49.67	71.00	75.00	14.780
Wing (g)	47.90	41.03	57.20	55.90	5.659

ab- mean values along the row with different superscripts are significantly different (P>0.05)

The results for carcass evaluation indicated that treatment effect on breast muscle was significant (P<0.05) though DWMP had no significant (P>0.05) effect on live weight, carcass weight, thigh muscle, shank, wing and neck. There was an increase in the values of these parameters as levels of DWMP in the diets increased. The finding agrees with earlier report that plant contain medicinal properties which allowed chickens to grow strong and healthy (Doyle, 2001). The superior value of the dressing % of birds fed varying levels of DWPM is an indication that total edible meat from birds on this treatment is higher than the meat yield from control. The differences observed in this parameter could be due to nutritional and health benefits of the watermelon peels which are beneficial to the growth of the birds. The finding is in harmony with the report of Neglo et al. (2021). The higher value weight of shank obtained on birds fed 3.75g DWMP compare to 2.5g, 1.25g and control group may suggest that the absorption of calcium in peels may be best in this inclusion.

Table 3. Organs weight of broiler birds fed DWMP

	TREATMENTS				
PARAMETERS (g)	**Diet 1 (0%)**	**Diet 2 (1.25%)**	**Diet 3 (2.5%)**	**Diet 4 (3.75%)**	**SEM**
Liver	18.60	19.53	19.37	17.70	1.293
Heart	5.00	3.80	5.07	3.83	0.315
Pancreas	6.73	4.87	4.00	5.90	0.415
Lung	4.80	4.47	4.60	4.97	0.242
Gizzard	32.73	22.77	31.30	32.00	1.686
Spleen	1.17	0.97	1.27	0.87	0.113
Small intestine	22.60	14.00	25.77	17.93	1.682
Large intestine	33.43	27.17	27.80	21.80	2.720

Proventriculus	6.73	4.87	4.00	5.90	0.415

The weight of internal organs of the birds in all the groups were not affected by the treatment diets (P<0.05). Birds fed DWMP at 1.25% shows higher weights of liver while heart, intestines and spleen were found to be heavier on birds fed 2.5% DWMP. Findings of this study showed that all organs performed well due to anti-microbial nature of watermelon that may have prevented any harmful effect to the organs. This finding however, did not agree with the report of Nwargo, Ogungbenro and Solesi (2010) and Machebe, Agbo and Onuaguluchi (2010) who reported that medicinal plants usage have been associated with organs damage due to toxic substances produce by the plant. The increase in these parameters are attributed to the fact that body organs are known to absorb drugs first before releasing them to entire cells for use. This may be the reason why DWMP groups have more organ weights than the control group. The finding did not favor the earlier report of Bello (2013) who reported the significant effect on internal organs.

Conclusion and recommendation: It can be concluded that dietary level of dried watermelon peel, up to 3.75% significantly (P<0.05) increased the breast muscle and enhances better dressing percentage of broilers at starter phase. It is recommended that further study be also carried out with finisher broiler birds and other poultry.

References

Alagbe, J.O. (2018). Performance and hemato-biochemical parameters of weaner rabbit fed diets supplemented with dried watermelon peel (rind) meal. Journal of Dairy and Veterinary Science, 8(4), 001-007.

Bello, S. (2013). Use of pawpaw (*Carica papaya*) leaf extract in the prevention of coccidiosis in broiler chickens. MSc Thesis. Department of Animal science, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Pp55-57.

Dias, P.G.I., Sajiwanie, J.W.A. and Rathnayaka, R.M.U.S.K. (2020). Chemical composition, physicochemical and technological properties of selected fruit peels as a potential food source. International Journal of Fruit Science, 20 2): S240-S251.

Doyle, E. (2001) Alternatives to antibiotic use for growth promotion in animal husbandry. Food Research Institute.

Gladvin, G., Sudhaakr, G., Swathi, V. and Santhisri, K. (2017). Mineral and vitamin content in watermelon peel. *International Journal of Current Applied Science*, 129-133.

KSUSTAM (2021). Kebbi State University of Science and Technology, Aliero Metrological station (KSUSTAM) data, Soil Science Department, Faculty of Agriculture.

Machebe, N.S., Agbo, C.U. and Onuaguluchi, C.C. (2010). Performance of finisher broilers served *Gongronema latifolia* Benth leaf extracts as supplementary source of vitamins and minerals, in *Proceedings of the 15th Annual Conference of Animal Science Association of Nigeria*.

Neglo, D., Tetteu, C.O., Essuman, E.K., Kortei, N.K, Boakye, A.A., Hunkpe, G., Amarh, F., Kwashie, P. and Devi, W.S. (2021). Comparative antioxidant and antimicrobial activities of the peel, rind pulp and seed of watermelon (*C. lanatus*). *Scientific African*, 11, 1-8.

Nguyen, L.T.N., Han, G., Yang, H., Ikeda, H., Eltahan, H.M., Chowdhury, V.S. and Furose, M. (2019). Dried watermelon rind mash diet increases plasma L-citrulline levels in chicks. *Journal of Poultry Science*, 56(1): 65-70.

Nworgu, F.C., Ogungbenro, S.A. and Solesi, K.S. (2007). Performance and some blood chemistry indices of broiler chicken served fluted pumpkin (*Telfaria occidentalis*) leaves extract supplement. *American-Eurasian Journal of Agricultural and Environmental*, 2 (1) 90–98.

Otu, B.O., Banjo, A.A., Kolo, S.P., Balogun, A.M. and Dabban, A.I. (2021). Growth performance and nutrient digestibility of starter broiler chickens fed levels of dried watermelon rind at the starter phase. *Nigerian Journal of Animal Production*, 48(3): 134-141.

Romelle, F.D., Rani, A. and Manohar, R.S. (2016) Chemical composition of some selected fruit peels. Eur. J. Food Sci. Technol., 4(4): 12–21. Alagbe, J.O. (2018). Performance and hemato-biochemical parameters of weaner rabbit fed diets supplemented with dried watermelon peel (rind) meal. *Journal of Dairy and Veterinary Science*, 8(4), 001-007.

Steel R.G.D. and Torries, J.H. (1980). *Principle and procedure of statistics*: A biometrical approach (2nd Edition). McGraw- Hill Book co., New York.