

Carcass yield and haematological indices of broiler chickens fed diets containing varying levels of dried watermelon rind (DWMR)

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Target Audience: Farmers, Researchers, Students

Abstract

150 day old unsex broiler chicks were used for the experiment to determine the effect of replacement of wheat offal with dried watermelon rind on the carcass yield and haematological indices of broiler birds. The chicks were randomly distributed into five treatments with each treatment having three replicates with ten chicks per replicate. Carcass yield and haematological indices were conducted in a completely randomized design comprising five dietary treatments such that T1 was served as the control, T2 were fed 25% DWMR replacement, T3 had 50 % DWMR, T4 had 75 % DWMR and T5 were given 100 % DWMR. At the end of the eight weeks, three birds from each dietary group were sacrificed to estimate the dressing yield and relative weight of organs (liver, heart and gizzard) while blood was collected for haematology and serum biochemistry analysis. Data collected were subjected to analysis of variance (ANOVA). Replacement of wheat offal with DWMR significantly ($p < 0.05$) improved the thigh, back, heart and lungs characteristics whereas it did not significantly ($p > 0.05$) influenced the live weight, slaughter weight, eviscerated weight and other primal cut parts. RBC and MCHC were significantly ($p < 0.05$) affected. It can be concluded from this study that DWMR can be included in broiler chickens diet with no negative effect on the carcass characteristics and serum indices.

Key words: Dried watermelon Rind, Carcass yield, Broilers, Haematology and serum indices

Description of Problem

Nutrition has the highest consideration in most livestock enterprise. The survival of the livestock industry relied on the availability of feedstuff, which are mainly component of human food (1). Many livestock farmers have already been sent out of business due to the cost of conventional feedstuff which is high, leading to a general decrease in the production and availability of animal protein for human dietary needs. It therefore becomes very imperative to intensify efforts in the search for cheaper, abundant and locally available alternatives that have no direct dietary value to man, for sustainable production (2). Protein being an essential component of the diet needed for survival of animals and humans due to its basic function in nutrition to supply

adequate amount of needed amino acids must be properly addressed (3). Watermelon (family *cucurbitaceae* and specie *Citrullus lanatus*) is a major fruit widely distributed in the tropics (4). As reported earlier (1), the fruit pulp serves as a thirst-quencher and an excellent source of minerals, vitamins A and C. Pulp of watermelon (*Citrullus lanatus*) are consumed in Nigeria without, in most cases, consuming the rinds/peels and seeds. It is often very difficult to assess the current health status of animals without detailed examination of blood (5). This research aimed to establish the carcass, gut morphology characteristics and haematological indices of broiler birds fed varying dietary inclusion of graded dried watermelon rind.

Materials and methods

The study was carried out at the Department of Animal Production Teaching and Research Farm, Federal University of Technology, Minna, Niger State, Nigeria. It is located within Latitude 9° 37' North and Longitude 6° 33' East (6). Watermelon rind was collected from various fruit sellers within the state. The watermelon rinds were washed with clean water and then cut into smaller pieces. It was sundried for three days and then oven dried in the laboratory for 2 hours at 50°C to ensure they were properly dried before milling was done. The dried watermelon rinds (DWMR) were later crushed using an attrition mill and added to the diets at five treatments

level. The feed formulated was administered as T1 –which contains 0 % of dried watermelon rind; T2 contains 25 % of DWMR; T3 contains 50 % of DWMR; T4 contains 75 % of DWMR and T5 contains 100 % of DWMR. A total of one hundred and fifty day old chicks were purchased from Agrited, Ibadan, Oyo State. The birds were randomly allotted to five treatments with three replicates per treatments and each replicate had 10 birds. The birds were fed standard formulated diet of about 22 % crude protein and about 2800 kcal/ kg ME at the starter phase as shown in Table 1 and about 20% crude protein and about 2900kcal / kg ME at the finisher phase as shown in Table 2. Data were collected.

Table 1: Ingredients composition of experimental diet at starter phase

Ingredients	T1	T2	T3	T4	T5
Maize	54.50	54.17	53.90	53.58	53.30
GNC	33.00	33.33	33.60	33.92	34.20
Wheat Offal	5.00	3.75	2.50	1.25	0.00
Fishmeal	3.00	3.00	3.00	3.00	3.00
DWMR	0.00	1.25	2.50	3.75	5.00
Bone meal	3.50	3.50	3.50	3.50	3.50
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated values					
Crude protein	22.48	22.48	22.46	22.45	22.44
M.E (Kcal/kg)	2,834.52	2,826.68	2,800.48	2,773.76	2,747.45
Crude fibre	3.71	3.60	3.48	3.70	3.25
E.E	4.52	4.46	4.40	4.35	4.29
Calcium	1.12	1.12	1.12	1.12	1.12
Phosphorus	0.71	0.70	0.68	0.67	0.65

Key- T₁ contain 0 % DWMR; T₂ contain 25 % DWMR; T₃ contain 50 % DWMR; T₄ contain 75 % DWMR; T₅ contain 100 % DWMR; DWMR: dried watermelon rind; GNC: groundnut cake; E.E: ether extract; M.E: metabolizable energy.

Table 2: Ingredient composition of experimental diets at finisher phase

Ingredients	T1	T2	T3	T4	T5
Maize	59.03	57.65	57.30	56.94	56.59
GNC	9.33	9.79	9.90	10.02	10.14
FFS	18.64	19.56	19.80	20.04	20.27
Fishmeal	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Wheat offal	5.00	3.75	2.50	1.25	0.00
Limestone	1.00	1.00	1.00	1.00	1.00
Methionine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
DWMR	0.00	1.25	2.50	3.75	5.00
Total	100.00	100.00	100.00	100.00	100.00
Calculated Analysis					
CP (%)	20.20	20.50	20.50	20.50	20.50
ME (Kcal/kg)	2,900.40	2,913.64	2,929.01	2,944.30	2,959.65
Ether extract (%)	7.11	7.24	7.27	7.31	7.33
Crude fibre (%)	4.03	4.15	4.25	4.34	4.43
Calcium (%)	1.32	1.33	1.33	1.33	1.33
Lysine (%)	1.06	1.11	1.51	1.19	1.23
Methionie + Cyst (%)	0.83	0.84	0.84	0.84	0.84

Keys: T1: Contain 0 % of DWMR, T2: Contain 25 % of DWMR, T3: Contain 50 % of DWMR

T4: Contain 75 % of DWMR, T5: Contain 100 % of DWMR, DWMR: Dried Watermelon Rind, GNC: Groundnut Cake, FFS: Full fat Soya

for carcass characteristics following the method described by Sanusi (7). Haematology and serum biochemical profile were carried out using Chem 5V3 semi-automatic analyzer (Alliance instruments France) and Abacus 380 haematology analyzer (Diamond Diagnostic, USA) respectively. All data obtained were subjected to Analysis of variance (ANOVA) using (8).

Results and Discussion

Carcass yield of broiler chickens

The mean values for cut parts of broilers fed graded level of dried watermelon rind is presented in Table 3. The mean values for live weight ranged from 1363.00 to 1576.67g, percentage slaughtered weight from 94.88 to 95.58 %, and percentage eviscerated weight from 73.87 to 76.53 %, percentage breast weight from 11.70 to 15.67 %, percentage

drumstick weight from 9.43 to 10.98 %, percentage thigh weight from 10.40 to 12.49 %. The live weight, percentage slaughtered weight, percentage eviscerated weight, percentage shank weight, percentage breast weight, percentage breast weight, percentage drumstick weight, percentage chest weight and percentage gizzard weight showed no significant difference ($P < 0.05$) on the carcass and cut – off parts. The results of the present study contradicted the findings of (2) who observed significant differences ($P < 0.05$) in the percentage back weight, percentage thigh weight, percentage lungs weight and percentage heat weight across the treatment groups with quails fed control diets having better highest mean weight than those placed on experimental diets in all aforementioned parameters.

Table 3: Carcass characteristics of broiler chickens fed diets containing dried watermelon rind (DWMR)

Parameters	T1	T2	T3	T4	T5	SEM	LS
Live weight (g)	1576.67	1410.00	1363.00	1460.00	1496.67	1.18	NS
*Slaughtered weight (%)	95.58	95.51	95.24	95.26	94.88	1.67	NS
*Eviscerated weight (%)	76.53	76.38	73.87	74.61	74.61	2.22	NS
*Shank weight (%)	4.20	4.30	4.25	4.85	4.36	0.29	NS
*Breast weight (%)	15.67	11.70	13.21	13.81	15.46	2.69	NS
*Drum stick weight (%)	9.43	9.80	9.79	10.11	10.98	0.81	NS
*Chest weight (%)	7.13	6.60	9.83	7.43	10.06	2.63	NS
*Back weight (%)	11.19 ^{ab}	11.09 ^{ab}	10.07 ^b	11.58 ^{ab}	12.60 ^a	0.92	*
*Thigh weight (%)	12.49 ^a	10.41 ^b	11.19 ^{ab}	12.05 ^{ab}	12.44 ^a	0.77	*
*Lungs weight (%)	0.47 ^c	0.85 ^{ab}	0.67 ^{bc}	1.01 ^a	0.70 ^b	0.09	*
*Gizzard weight (%)	1.65	2.03	1.71	1.80	1.78	0.19	NS
*Heart weight (%)	0.60 ^b	1.07 ^a	0.66 ^b	0.73 ^b	0.60 ^b	0.14	*

Keys: ^{abc} means within a row having different superscripts differed significantly, T1: Contain 0 % of DWMR, T2: Contain 25 % of DWMR, T3: Contain 50 % of DWMR, T4: Contain 75 % of DWMR, T5: Contain 100 % of DWMR, * = Significant, NS= Not significant, SEM = Standard error of mean, + = parameters ratio to live weight,

Serum biochemical profile and haematological indices of broiler chickens fed diets containing varying levels of dried watermelon rind (DWMR)

The results obtained from the serum biochemistry and haematology studies (Table 4 and 5) indicate a significant ($P < 0.05$) difference from the control in RBC and MCHC with values ranging from 4.47 – 5.30 and 33.07 – 33.27 respectively. PCV, WBC, MCV and MCH were not significantly ($P > 0.05$) different from the control. The significant difference obtained in the RBC may be as a

result of the phenol present in the dried watermelon rind (DWMR). Phenol has been reported by (9) to play a vital role in red blood cell modifier. All other parameters measured were similar to the report of (10) who fed weaner rabbits dried watermelon rinds and reported no significant differences amongst all treatments. This may be due to the concentration of heat stable metabolites presents in the watermelon rind used in the diets which drying could not effectively treat. The results of the serum biochemistry on all parameters measured were not significantly

Table 4: Effects of watermelon rind on serum biochemical parameters of broiler chickens (0–8 weeks)

INDICES	T1	T2	T3	T4	T5	SEM
GLU	113.33	116.33	115.00	116.00	115.67	0.66
TP (g/dl)	1.87	1.90	1.77	1.87	1.93	0.04
AST (I.U/1)	12.33	12.67	12.33	12.33	12.33	0.13
ALT (I.U/ 1)	8.00	8.33	8.00	8.00	8.67	0.14
ALP	19.00	19.00	18.67	18.67	21.33	0.54

GLU (Glucose); TP (Total Protein); AST (Aspartate aminotransferase); ALT (Alanine aminotransferase); ALP (Alkaline phosphatase)

Table 5: Effects of watermelon rind on haematological parameters of broiler chickens (0 – 8 weeks)

Indices	T1	T2	T3	T4	T5	SEM	LS
Hb	8.97	9.50	8.77	9.50	10.63	0.27	NS
PCV	27.00	28.67	26.33	29.00	32.00	0.83	NS
RBC	4.47 ^{ab}	4.73 ^{ab}	4.73 ^c	4.73 ^{ab}	5.30 ^a	0.13	*
WBC	2.47	2.67	2.33	2.60	3.17	0.12	NS
MCV	60.23	60.50	60.27	60.50	60.33	0.77	NS
MCH	20.03	20.07	20.07	20.03	20.03	0.02	NS
MCHC	33.17 ^b	33.10 ^{ab}	33.27 ^a	33.07 ^c	33.27 ^a	0.03	*

Hb (Haemoglobin); PCV (Packed Cell Volume); RBC (Red Blood Cell); WBC (White Blood Cell); MCV (Mean Corpuscular Volume); MCH (Mean Corpuscular Haemoglobin) and MCHC (Mean Corpuscular Haemoglobin Concentration), ^{abc} means within a row having different superscripts differed significantly

($p > 0.05$) different from the control, although there was slight variation from the control as inclusion of DWMR increases in some of the parameters measured.

Conclusion and Applications

1. Since there is no deleterious effect in the replacement of wheat offal with dried watermelon rind, complete substitution of wheat offal with DWMR would be effective in improving the carcass quality of broiler chickens fed diets containing varying levels of dried watermelon rind.
2. Complete substitution of wheat offal with DWMR maintained blood indices and serum biochemistry of broiler chickens which serve as indicators of the health status of the broiler chickens.

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