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UTILIZATION OF AFRICAN STAR APPLE (*CHRYSOPHYLLUM ALBIDUM*) KERNEL MEAL IN BROILER DIETS

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Abstract: The effect of feeding graded levels (0, 5, 10, 15, 20, 25 and 30%) of untreated African star apple kernel meal (ASAKM) on the performance and blood profile of broilers was investigated in an 8-week trial. Two hundred and ten one-week-old Cobb strain broiler chicks were randomly allotted to 7 diets with 3 replicates of 10 chicks per replicate in a completely randomized design. Data on minerals, vitamins, amino acids and quantification of some anti-nutrients were assayed. The results showed that the kernel was high in nutrients, especially carbohydrate as a source of energy but contains high levels of anti-nutritional or toxic factors. Performance traits ($p<0.05$) of broilers fed ASAKM gave poor results though without mortality. The increment of dietary levels of the untreated ASAKM did not negatively influence blood composition and most of the measured biochemical indices, the parameters were better ($p<0.05$), or had values statistically similar with the control diet compared with those on the test diets ($p>0.05$). Increasing levels of ASAKM in diets caused elevation of AST, ALT, ALP and a significant increase in blood urea levels in the raw kernel meal based diets relative to the control diet ($p<0.05$). Based on the performance of the birds fed the raw ASAKM, it may be concluded that broilers could barely tolerate 5% raw ASAKM in their diets with minimum adverse effects. However, the values of the blood parameters particularly the red blood cells favoured erythropoiesis, suggesting that the African star apple kernel meal had no detrimental effect on the health status of the birds. Subsequent research should process the raw star apple seed meal before dietary inclusion for optimum results.

Key words: ASAKM, poultry, performance, serum biochemical, haematological parameters.

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Introduction

The need to develop cheap and readily available alternate feeding materials to support the growth of food animals in developing countries, Nigeria inclusive, is receiving great attention. This is due to the daily increase in human population which creates high demand on animal protein in diets of the populace. Feed, which has always been a major limiting factor in the growth of the poultry industry, accounts for about 70–75% of the total cost of intensive production. Evaluation of unconventional feeding stuff for use by farm animals to mitigate competition among humans, animals and industries for the limited conventional feeding materials is receiving attention by researchers to solve the problem.

African star apple (*C. albidum*) is an indigenous wild fruit tree with enormous potentials for plantation establishment, and the fruit/seed could serve as an alternative carbohydrate or energy foodstuff (Okigbo, 1978; Okafor, 1981). *C. albidum* is reported to be an important tree in the agro-forestry system and is cultivated in Nigeria, Uganda, Niger, Cameroon, Ivory Coast republics on commercial scale (Adewusi and Bada, 1997).

Preliminary investigations (Ajewole and Adeyeye, 1991) found that *C. albidum* seed contains valuable nutrients such as crude protein, carbohydrate, crude fat, crude fibre, mineral matter in concentrations of 8.75, 83.38, 3.45, 2.42 and 2.00% respectively warranting the potentials of the seed as a good novel feedstuff in animal feed. However, like numerous plants, the tree and products contain many anti-nutrients or phytochemicals including cyanogens, flavonoids, oxalate, phenolics, phytate, saponins, tannins, terpenoids which have been established by research to have deleterious effects on nutrition by diminishing nutrient bioavailability or utilization in the consumer if ingested in high levels solely or in diets (Ojiako and Igwe, 2008). The phytotoxins are also implicated in eliciting adverse toxic biochemical and physiological responses in the body (Igile, 1996). Early works by Annongu and Abimbola, (2003) and Amaefule et al. (2006) observed that monogastric animals can utilize non-conventional feedstuffs successfully in their diets. It is for this reason that this study investigated the use of star apple seed kernel (*Chrysophyllum albidum*) in nutrition of broilers to determine its acceptability and optimum level of replacing maize.

Materials and Methods

Experimental diets and management of birds

African star apple fruits for this trial were collected from a plantation in Osun State of Nigeria. The seeds were removed from the fruits, washed, sun dried and further dehulled to obtain the kernels. The kernels were milled for inclusion in diet mixtures. Seven diets were formulated to comprise graded levels of African star apple kernel meal (ASAKM) at inclusion rates of 0, 5, 10, 15, 20, 25 and 30% in replacing maize in the diets of the birds. Two hundred and ten day-old Cobb strain broiler chicks from Zartech commercial farms, Oyo State, Nigeria were fed for one week on a standard broiler starter diet before the commencement of the experiment for both the starter and finisher phases. The birds were randomly allotted to 7 diets with 3 replicates of 10 chicks per replicate using a one-way analysis of variance. Experimental diets and drinking water were given to the chicks *ad libitum* in a study that lasted for 8 weeks. The composition of the experimental diets on as-fed basis (for broiler starter and finisher phases) and their analysed nutrient contents are presented in Tables 1 and 2.

Table 1. Composition of the experimental diets for broiler starter (kg/100kg diet).

	Inclusion levels of African star apple kernel meal						
Parameter (%)	0	5	10	15	20	25	30
Maize	56.46	53.63	50.81	47.99	45.17	42.34	39.52
African star apple kernel meal	0.00	2.83	5.65	8.47	11.29	14.12	17.94
Soybean meal	38.04	38.04	38.04	38.04	38.04	38.04	38.04
Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Broiler premix	0.30	0.30	00	0.30	0.30	0.30	0.30
Total	100	100	100	100	100	100	100
Calculated nutrient analysis of the diet							
Metabolizable energy kcal/kg	3132.74	3118.63	3104.57	3090.52	3076.46	3062.35	3077.62
Crude protein	22.99	22.95	22.90	22.85	22.80	22.75	22.70
Ether extract	3.74	3.63	3.52	3.40	3.29	3.18	3.06
Crude fibre	4.02	3.95	3.87	3.79	3.72	3.64	3.57
Ash	1.07	1.04	1.00	0.96	0.93	3.18	3.06
Analysed nutrient composition of the diet (%)							
Dry matter	90.15	90.37	90.13	90.18	90.67	90.19	90.08
Crude protein	23.20	21.91	22.41	21.98	22.78	23.64	22.99
Ether extract	2.47	2.90	2.70	2.71	2.46	2.36	2.02
Crude fibre	2.64	2.62	2.30	2.77	2.70	3.31	3.06
Ash	8.64	8.11	7.34	9.45	8.59	9.33	7.13
NFE	63.05	64.46	67.53	63.09	63.47	61.36	64.80

Table 2. Composition of the experimental diets for broiler finisher (kg/100kg diet).

	Inclusion levels of African star apple kernel meal						
Parameter (%)	0	5	10	15	20	25	30
Maize	63.91	60.71	57.52	54.32	51.13	47.93	44.74
African star apple kernel meal	0.00	3.20	6.39	9.59	12.78	15.98	19.17
Soybean meal	30.19	30.19	30.19	30.19	30.19	30.19	30.19
Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Bone meal	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Limestone	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Broiler premix	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	100	100	100	100	100	100	100
Calculated nutrient analysis of the diet							
Metabolizable energy kcal/kg	3153.71	3137.76	3121.86	3105.90	3089.99	3074.04	3058.14
Crude protein	20.00	19.74	19.49	19.23	18.97	18.71	18.60
Ether extract	3.77	3.64	3.51	3.38	3.25	3.13	3.00
Crude fibre	3.71	3.63	3.54	3.46	3.37	3.28	3.20
Ash	1.17	1.13	1.09	1.05	1.00	0.96	0.92
Analysed nutrient composition of the diet (%)							
Dry matter	89.06	89.34	89.30	89.32	89.30	89.15	89.26
Crude protein	19.80	20.51	21.11	21.59	21.57	21.68	21.49
Ether extract	2.21	2.16	2.14	2.09	2.13	2.10	2.04
Crude fibre	2.03	2.50	3.02	3.23	3.47	3.48	3.46
Ash	6.94	7.13	7.52	6.56	6.97	6.46	6.52
NFE	69.02	67.70	66.53	66.53	65.86	66.28	66.49

Data collection/Response criteria

In the course of the experiment, data were recorded on the feed intake, daily weight gain, feed conversion ratio and the mortality rate. At the end of the experiment, one broiler per replicate in all the dietary treatments was taken at random and blood collected from the wing web using syringes and sterilized needles in accordance with the ethical requirements of the University of Ilorin for the procedures using animals in experiments. Blood samples collected in sample bottles with the anti-coagulant (EDTA) were used to assay for the following haematological parameters: packed cell volume (PCV), red blood cell (RBC), haemoglobin (Hb), white blood cell (WBC). The mean cell volume (MCV), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration (MCHC) were calculated. Blood for serum biochemistry was taken in test tubes without anti-coagulant for the analysis of blood glucose level, serum total protein, albumin, globulin and albumin/globulin was calculated. The lipid profile (triglyceride, total cholesterol, high density lipoprotein [HDL]) and low density lipoprotein (LDL), blood urea and creatinine, enzyme activities (aspartate aminotransferase [AST]), alanine aminotransferases (ALT) and alkaline phosphate (ALP) were also assayed. The sera were also used for the determination of blood electrolytes, calcium (Ca^{2+}), sodium (Na^{+}), phosphorus (P), potassium (K^{+}) and magnesium (Mg^{2+}).

Chemical analyses

Chemical analysis was carried out in the Central Research Laboratory and Department of Biochemistry, University of Ilorin. Blood metabolites were assayed for in the haematological and clinical chemistry laboratories of the Faculty of Veterinary Medicine, University of Ilorin, Kwara state, Nigeria using appropriate equipment and analytical kits.

Statistical analysis

Data were analysed by analysis of variance (ANOVA) according to the one-way classification design model. Differences between treatment means were separated using Duncan's multiple range test as described by Steel and Torrie (1980).

Results and Discussion

Results on the chemical composition of the minerals, vitamins, amino acids (Tables 3, 4 and 5) in the African star apple seed kernels obtained from the western part of Nigeria confirmed that African star apple tree and products contained reasonable amounts of valuable nutrients and the kernels were particularly high in carbohydrate as a source of energy. This finding suggests that the kernels could serve as a useful alternative energy source in the diet of animals. Findings on the nutritional content of *C. albidum* in this investigation agreed with past reports (Ajewole and Adeyeye, 1991; Edem and Miranda, 2011; Ukana et al., 2012) that the star apple tree, its fruits and seed are high in nutrients which could be used as cheap alternative sources of nutrients in the nutrition of man and domestic animals. Conversely, the phytochemicals (Table 6) present in the seed are high in anti-nutritional or toxic factors, namely flavonoids, saponins, phenolics including tannins, anti-mineral elements (oxalate and phytates), terpenoids as well as the undetermined cyanogens in this study. These phytochemicals have been shown to elicit adverse effects on nutrition and health of man and livestock with possible physiological abnormalities especially when consumed in amount exceeding normal threshold limits (Kersten et al., 1991; Igile, 1996). For example, the effect of saponins on chicks has been reported to reduce growth, feed efficiency and interfere with the absorption of dietary lipids, cholesterol, bile acids and vitamins A and E respectively (Jenkins and Atwal, 1994).

Table 3. Proximate and mineral composition of African star apple kernel meal.

Parameters	% concentration
Dry matter	91.38 ± 5.17
Crude protein	8.71 ± 0.49
Crude fat	3.10 ± 0.18
Mineral matter	4.79 ± 0.27
Crude fibre	7.42 ± 0.42
Soluble carbohydrate	67.36 ± 3.81
Metabolizable energy (Kcal/kg)	2,939
Nutrient minerals	% concentration
Calcium (Ca)	0.077 ± 0.00438
Phosphorus (P)	0.46 ± 0.02602
Potassium (K)	0.038 ± 0.00014
Magnesium (Mg)	0.008 ± 0.00042
Sodium (Na)	0.815 ± 0.04610
Manganese (Mg)	0.062 ± 0.00353
Iron (Fe)	0.821 ± 0.04638
Zinc (Zn)	0.075 ± 0.00424
Chloride (Cl)	0.006 ± 0.00028

Values for each parameter are taken from an average of two (2) determinants.

Table 4. Vitamin composition of African star apple kernel meal.

Water soluble vitamins (%)	
Vitamin B1 (thiamin)	0.0013 ± 0.00014
Vitamin B2 (riboflavin)	0.0028 ± 0.00014
Vitamin B3 (niacin)	0.0080 ± 0.00042
Vitamin C (ascorbic acid)	0.3983 ± 0.00042
B-carotene	0.3662 ± 0.02249
Fat soluble vitamins (%)	
Vitamin A (retinol)	0.693 ± 0.03917
Vitamin E (tocopherol)	0.957 ± 0.05416
Vitamin D and K	ND

ND, not detected.

The cyanide ions inhibit several enzyme systems; depress growth through interference with certain essential amino acids and utilization of associated nutrients. They also cause acute toxicity, neuropathy and death (Osuntokun, 1972). Oxalate and phytate bind minerals essential to the body and interfere with their metabolism in addition to causing muscular weakness, paralysis, gastrointestinal tract irritability, hypocalcaemia, nephrotic lesions in the kidney when consumed in an unprocessed food (Ojiako and Igwe, 2008; Blood and Radostits, 1989). Too much of soluble oxalate in the body prevents the absorption of soluble calcium ions which are bound to form insoluble calcium-oxalate complex resulting to kidney stones (Adeniyi et al., 2009). Tannins in poultry diets reduce dry matter intake, body weight gain, feed efficiency and nutrient digestibility (Hassan et al., 2003)

Table 5. Amino acid profile of African star apple kernel meal.

Amino acid	g/100g sample
Alanine	3.00 ± 0.17
Arginine	3.79 ± 0.21
Aspartic acid	6.30 ± 0.36
Cystine	0.73 ± 0.04
Glutamic acid	7.27 ± 0.41
Glycine	3.42 ± 0.19
Histidine	1.63 ± 0.09
Isoleusine	2.62 ± 0.15
Leucine	7.18 ± 0.41
Lysine	2.86 ± 0.16
Methionine	0.64 ± 0.04
Phenylalanine	3.19 ± 0.18
Proline	3.05 ± 0.17
Threonine	2.30 ± 0.13
Tryptophan	0.68 ± 0.04
Valine	2.98 ± 0.17

Table 6. Quantitative analysis of African star apple kernel meal.

Anti-nutrient	(mg/kg)
Flavonoids	26.54 ± 1.50
Oxalate	0.80 ± 0.05
Phytate	131.00 ± 7.41
Saponins	12.15 ± 0.69
Tannins	1.04 ± 5.88
Terpenoids	1.37 ± 7.75
Total phenolics	7.91 ± 4.48

The result of the impact of feeding ASAKM in the diets of broilers on the performance traits is shown in Table 7. Increasing levels of the raw kernel meal in the broiler's diets resulted in decreased ($p<0.05$) feed consumption, body weight gain and increased poor feed conversion ratio observed in the birds and these findings corroborate the reports of Igile (1996) that phytochemicals elicit toxic biological responses with possible physiological implications. Similarly, the reduced weight gains observed in the test groups are in line with the findings of Jenkins and Atwal (1994) that saponins reduce growth, feed efficiency and interfere with the absorption of dietary lipids, cholesterol, bile acids, vitamins A and E in chicks. An early report by Kumar (1992) has also stated that the utility of *C. albidum* in monogastric poultry is limited due to the presence of phytotoxins. The observed insignificant differences between the control diet value and values of mortality rate of ASAKM diets (P>0.05) may suggest that poultry could tolerate high inclusion of the test feedstuff in their diet and better if the test ingredient is adequately processed.

Table 7. Performance characteristics of broilers fed raw *C. albidum* kernel meal.

	Inclusion level of African star apple kernel meal							
Parameter (%)	0	5	10	15	20	25	30	SEM
Initial live weight (g/)	99.04	99.04	99.04	99.52	99.52	100.47	99.04	1.09
Final live weight (g)	1910.1^{a}	1255.7^{b}	885.0^{c}	479.2^{d}	474.1^{d}	395.0^{e}	388.83^{e}	4.99*
Weight gain (g/day)	32.34^{a}	20.66^{b}	14.04^{c}	6.78^{d}	6.69^{d}	5.29^{d}	5.15^{d}	0.65*
Feed intake (g/day)	116.87^{a}	99.37^{b}	91.32^{b}	71.40^{c}	69.90^{c}	68.36^{e}	65.23^{c}	1.45*
Feed conversion ratio	3.61^{d}	4.84^{d}	6.63^{c}	10.53^{b}	10.32^{b}	12.84^{a}	13.23^{a}	0.54*
Mortality rate (%)	0.00	0.00	0.33	0.00	0.33	0.33	0.00	0.35NS

SEM = Standard error of mean; NS = Non significant (P>0.05); *Significant (p<0.05); ^{a,b,c,d,e}Means with different superscripts along the same row are significantly different.

The result on the blood composition is presented in Table 8. There were significant (p<0.05) differences in the haematological parameters as the level of the ASAKM increased in the diet except for the mean cell haemoglobin (MCH).

Table 8. Blood composition of broilers fed raw *C. albidum* kernel meal.

	Inclusion levels of African star apple kernel meal							
Parameters (%)	0	5	10	15	20	25	30	SEM
RBC ($\times 10^{12}$/l)	3.12^{d}	3.08^{d}	6.33^{ab}	6.52^{a}	5.83^{c}	5.95^{c}	6.09^{b}	0.10*
Hb (g/dl)	6.80^{d}	6.60^{d}	11.80^{c}	12.30^{bc}	12.90^{b}	13.20^{a}	13.40^{a}	0.25*
PCV (%)	16.00^{d}	16.00^{d}	35.00^{a}	37.00^{a}	35.00^{a}	36.00^{a}	37.00^{a}	1.25*
MCV (fl)	51.28^{c}	51.94^{c}	55.29^{b}	56.74^{b}	60.03^{a}	60.50^{a}	60.75^{a}	0.95*
MCH (pg)	21.79	21.42	18.6	18.86	22.15	22.35	22.00	0.83NS
MCHC (g/dl)	42.50^{a}	41.25^{a}	33.71^{bc}	33.24^{c}	36.85^{b}	36.66^{b}	36.22^{bc}	0.90*
WBC ($\times 10^{9}$/l)	16.10^{a}	15.50^{a}	10.55^{b}	$9.52b^{c}$	8.19^{c}	6.13^{d}	5.89^{d}	0.58*

The haemoglobin (Hb) increased in response to increasing dietary levels of the ASAKM except for the birds at the 5% inclusion level of the test diet. There was a consistent increase in the mean cell volume (MCV) in response to increasing dietary inclusion levels of the ASAKM. The red blood cell (RBC) and the packed cell volume (PCV) did not follow a particular trend. However, the trend in the values of the haematological parameters revealed that the rich mineral content of the dietary African star apple kernel meal positively influenced haematopoiesis, hence favouring blood production.

Serum biochemical parameters are presented in Table 9. Blood glucose level, serum total protein and globulin increased ($p<0.05$) as the dietary levels of the African star apple kernel meal increased across the treatments. Similarly, dietary inclusion of the star apple kernel meal at graded levels did not exert any adverse effect on the lipid composition of the broilers as values of the triglyceride, total cholesterol, HDL and LDL diminished concomitantly with increasing dietary levels of ASAKM ($p<0.05$). Blood electrolytes (Ca^{2+}, Na^{+}, K^{+}, Cl^{-}, HCO_3^{-}) tended to increase with a corresponding increase in ASAKM meal levels in diets suggesting that the test feedstuff contained adequate nutrient minerals to maintain the electrolyte balance in the birds.

Table 9. Serum biochemical indices of broilers fed raw *C. albidum* kernel meal.

	Inclusion levels of African star apple kernel meal							
Parameter (%)	0	5	10	15	20	25	30	SEM
Glucose (mmol/)	7.10^{d}	7.50^{c}	7.90^{b}	8.10^{b}	8.80^{a}	8.70^{a}	8.90^{a}	0.29*
Total protein (g/l)	31.00^{c}	36.00^{bc}	39.00^{ab}	40.00^{ab}	42.00^{ab}	44.00^{a}	45.00^{a}	1.17*
Albumin (g/l)	27.00	28.00	26.00	27.00	24.00	23.00	18.00	1.96NS
Globulin (g/l)	4.00^{d}	8.00^{d}	13.00^{c}	13.00^{c}	18.00^{b}	21.00^{b}	27.00^{a}	1.31*
A/G ratio	8	3	2	2	1	1	0	
Total cholesterol (mmol/l)	2.40^{a}	0.92^{b}	0.40^{c}	0.30^{cd}	0.20^{d}	0.40^{c}	0.30^{cd}	0.05*
HDL cholesterol (mmol/l)	0.40^{a}	0.30^{b}	0.20^{c}	0.10^{d}	0.10^{d}	0.10^{d}	0.10^{d}	0.02*
LDL cholesterol (mmol/l)	2.10^{a}	0.80^{b}	0.20^{c}	0.20^{c}	0.10^{c}	0.10^{c}	0.10^{c}	0.04*
Triglyceride (mmol/l)	1.30^{a}	0.60^{b}	0.50^{bc}	0.50^{bc}	0.40^{c}	0.30^{d}	0.30^{d}	0.04*
Calcium (mmol/l)	2.10^{c}	2.10^{c}	2.20^{bc}	2.40^{bc}	2.30^{bc}	2.50^{b}	2.90^{a}	0.27*
Sodium (mmol/l)	138^{c}	140^{bc}	145^{a}	140^{bc}	138^{bc}	143^{ab}	142^{ab}	0.88*
Potassium (mmol/l)	4.30^{cd}	4.40^{bcd}	4.50^{bc}	4.30^{cd}	4.10^{d}	4.70^{ab}	4.90^{a}	0.26*
Chloride (mmol/l)	70.00^{d}	83.00^{c}	88.00^{bc}	70.00^{d}	75.00^{d}	92.00^{b}	105.00^{a}	1.12*
Bicarbonate (mmol/l)	24.00	25.00	25.00	26.00	25.00	26.00	25.00	0.82NS
AST(IU/L)	14.00^{g}	29.00^{f}	38.20^{e}	59.30^{d}	72.15^{c}	82.00^{b}	94.00^{a}	1.24*
ALT(IU/L)	7.00^{f}	16.00^{e}	50.20^{d}	57.60^{c}	60.91^{c}	64.31^{b}	69.00^{a}	1.84*
ALP(IU/L)	104.6^{f}	124.7^{e}	156.5^{d}	160.8^{d}	197.6^{a}	183.7^{c}	189.20^{b}	0.95*
Urea (mmol/l)	1.20^{d}	1.30^{cd}	1.40^{bcd}	1.40^{bcd}	1.60^{abc}	1.70^{ab}	1.80^{a}	0.08*
Creatinine (mmol/l)	0.74^{a}	0.41^{b}	0.37^{bc}	0.35^{bc}	0.27^{c}	0.25^{c}	0.13^{d}	0.03*

A/G = Albumin globulin ratio; HDL = High density lipid; LDL = Low density lipid; ^{a,b,c,d,e,f}Means with different superscripts along the same row are significantly different.

Activities of AST, ALT and ALP were elevated as the quantity of raw African star apple kernel meal increased in diet ($p<0.05$), which may attest to the fact that phytotoxins in the untreated kernel meal cause high enzyme activities in the blood. The increment in ALT activity as recorded in diets 2 to 7 compared with the control diet suggests the likelihood of liver damage by direct feeding of the raw kernel meal. Similarly, a significant increase in the serum urea levels of the birds fed the test ingredient is an indication of poor utilization of protein in the ASAKM. Based on results of the performance characteristics and the blood metabolites, broilers could barely tolerate 5% raw ASAKM meal diets. The appropriate processing method is therefore recommended.

Conclusion

The findings from this study imply that the birds could barely tolerate beyond 5% inclusion level of the ASAKM, based on the result of the performance characteristics, however, the haematological parameters revealed that the rich mineral content of the dietary African star apple kernel meal positively influenced erythropoiesis. There is the need to adequately process the ASAKM for optimum utilization by the birds.

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KORIŠĆENJE SAČME OD SEMENA AFRIČKOG HRIZOFILUMA (*CHRYSOPHYLLUM ALBIDUM*) U ISHRANI BROJLERA

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R e z i m e

U osmonedeljnom eksperimentu ispitivan je uticaj različitih nivoa (0, 5, 10, 15, 20, 25 i 30%) netretirane sačme od semena hrizofiluma (engl. *African star apple kernel meal* – ASAKM) u ishrani brojlera na proizvodne parametre i profil krvi. Eksperiment je postavljen po modelu slučajnog plana, sa dve stotine i deset jednonedeljnih brojlerskih pilića (hibrid *Cobb*), raspoređenih u sedam tretmana (obroka), po deset pilića u tretmanu i sa tri ponavljanja za svaki tretman. Ispitivane su količine minerala, vitamina, amino kiselina i nekih antinutritivnih materija. Rezultati su pokazali da je seme bogato hranljivim materijama, posebno ugljenim hidratima kao izvorom energije, ali da sadrži i visoke nivoe antinutritivnih ili toksičnih faktora. Upotreba sačme od afričkog hrizofiluma uticala je negativno na proizvodne rezultate ($p<0,05$), ali bez smrtnosti pilića. Povećanje nivoa netretirane sačme od semena afričkog hrizofiluma u ishrani nije negativno uticalo na sastav krvi i većinu praćenih biohemijskih parametara, koji su bili bolji ($p<0,05$) ili su imali vrednosti statistički slične tretmanu sa kontrolnim obrokom ($p>0,05$). Povećanje nivoa sačme od semena afričkog hrizofiluma u obroku izazvalo je porast AST, ALT, ALP i značajno povećanje nivoa uree u krvi za obrok sa svežom sačmom u odnosu na kontrolni obrok ($p<0,05$). Na osnovu produktivnosti ptica kojima je davana sveža sačma od semena afričkog hrizofiluma, moglo bi se zaključiti da brojleri mogu tolerisati najviše do 5% ovog hraniva, sa minimalnim neželjenim efektima. Međutim, vrednosti parametara krvi, posebno crvenih krvnih zrnaca koje sugerišu na favorizovanje eritrocitopoeze, ukazuju da sačma od semena afričkog hrizofiluma nije štetno uticala na zdravlje ptica. U narednim istraživanjima treba koristiti obrađenu sačmu u cilju dobijanja optimalnih rezultata.

Ključne reči: ASAKM, živina, proizvodni rezultati, biohemijski i hematološki parametri seruma.

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