Haematological and Biochemical Response of Cockerels Fed Processed Tropical Sickle Pod (*Senna obtusifolia*) Seed meal

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Abstract: A feeding trial was conducted for sixteen (16) weeks to investigate the effects of feeding raw and processed *Senna obtusifolia* seed meal based-diets on the haematological and biochemical parameters of growing cockerels. Six experimental diets were compounded to contain 0 and 20% each of the raw, boiled, soaked sprouted and fermented *Senna obtusifolia* seed meal, were designated T1, T2, T3 T4, T5 and T6, respectively. Two hundred and sixteen (216) cockerels were randomly allotted to the six dietary treatments in a Randomized Complete Block Design (RCBD), replicated three times with twelve (12) birds each. The chickens were managed on deep litter pens of 12 birds/2.22 M^2. Data were collected on packed cell volume (PCV), haemoglobin (Hb), red blood cell count (RBC), white blood cell count (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), Total protein, albumin, globulin, cholesterol, creatinine, alkaline phosphatase, aspartate amino transferase (AST) and alanine amino transferase (ALT) and were analysed using a computer statistical package (Statistix 9.0). The results of the investigation revealed non-significant effect ($P>0.05$) on the haematological parameters except for the mean corpuscular volume. Some of the biochemical parameters were significantly ($P<0.05$) influenced by the dietary treatments. The least total protein (2.47 g/dl) and albumin (1.40 g/dl) were recorded in the group of growing cockerels fed raw *Senna obtusifolia* seed meal (RSOSM) based-diet. Serum enzymes and bilirubin levels were observed to be more elevated in the group of cockerels fed RSOSM. based-diets. The AST, ALT and total bilirubin level of the cockerel fed RSOSM based-diet were 14.35U/L, 7.20U/L and 13.4 mmol/L. However, significant ($P<0.05$) improvement of the biochemical parameters were observed in the group of growing cockerels fed the processed *Senna obtusifolia* seed meal based-diets, with the group fed the fermented *Senna obtusifolia* seed meal based-diets exhibiting better biochemical indices. It can be concluded that processed *Senna obtusifolia* seed meal especially the fermented seed meal has nutritional potential as feed ingredient for feeding cockerels with little or no depreciation on the haematological and biochemical indices of cockerels and is therefore recommended for feeding cockerels.
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Introduction

The rising feed crises in the Nigerian livestock industry can be addressed by harnessing the nutritional potentials of wild legumes that are predominant in Nigeria (Augustine *et al*., 2016). Igene *et al*. (2012) further buttressed that the search for alternative protein sources for livestock feeding in developing countries because of high cost and scarcity of the conventional protein sources such as soya bean meals and groundnut cake is a continuous one. One of the approaches of solving this problem is the use of non-conventional feed resources (Tamburawa *et al.*, 2017). In this context, the utilization of lesser-known legumes such as *Senna obtusifolia* has emerged to fit in this bill. *Senna obtusifolia* is a pantropical weed that belongs to the family *leguminosae caesapinioideae*. It is an erect bushy annual shrub that grows up to 90 cm tall and propagates through seed. The leaflets consist of three pairs and each leaflet is obovate, 1.5-5 cm long and 1-3 cm wide, mucronate at the apex and the flowers are yellow in colour (Akobundun and Agyakwa, 1998).

The chemical composition of *Senna obtusifolia* seed as indicated by Ingweye *et al*. (2010) and Augustine *et al*. (2014) indicated that it has some toxic components such as tannins, oxalate, phytates and saponins. These toxic components may exhibit some toxicity effects when ingested. Even if the seeds are processed, the issue of residual anti-nutritional factors cannot be completely ruled out. Therefore, it is important to conduct Haematobiochemical studies to investigate the effects of processed *Senna obtusifolia* on blood parameters of cockerel chickens. A readily available and fast means of assessing clinical and health status of animals on feeding trials may be the use of blood analysis because ingestion of dietary components have measurable effects on blood composition (Church, 1984; Maxwell, 1990). At the

moment, information on haematological and biochemical response of cockerel chickens fed processed *Senna obtusifolia* seems to be very scanty hence the need to conduct more studies and bridge such information gap. It is in view of the above that this study was designed to evaluate the haematological and biochemical indices of cockerel chickens fed processed *Senna obtusifolia* seed meal.

Materials and methods

Location of the study area

The study was conducted at the Poultry Unit of the Department of Animal Production Livestock Teaching and Research Farm, Adamawa State University, Mubi. The area is located between latitudes $9^{o}30^{'}$ and 11^{o} North of the equator and longitudes 13^{o} and 13^{o} $45^{'}$ East of the Greenwich meridian. The temperature regime in Mubi region is warm to hot throughout the year however, there is usually a slight cold period between November and February. There is a gradual increase in temperature from January to April. The minimum and maximum temperatures of the area are 18.1^{o}C and 32.8^{o}C and the mean annual rainfall ranges from 900-1050 mm (Adebayo, 2004).

Experimental diets (treatments)

The raw and differently processed *Senna obtusifolia* seed meal (boiled, soaked, sprouted and fermented) were included at 20% each in the diets of cockerels at both the chick and grower stages respectively (Tables 1 and 2). The six (6) treatment diets were designated T1, T2, T3, T4, T5 and T6, respectively. Diet T1 contained 0% *Senna obtusifolia* seed meal and therefore served as the positive control while diet T2 contained the 20% raw *Senna obtusifolia* and served as the negative control. Diet T3, T4, T5 and T6 contained 20% each of the boiled, soaked, sprouted and fermented *Senna obtusifolia* seed meal.

Table 1: Ingredient Composition and Calculated Analysis of the Experimental Chick Mash

Level of inclusion of *Senna obtusifolia* seed meal						
Ingredient	**T1 (0%SOSM)**	**T2 (20%RSOSM)**	**T3 (20%BSOSM**	**T4 (20%SkSOSM)**	**T5 (20%SPSOSM)**	**T6 (20%FSOSM)**
Maize	50.00	50.00	50.00	50.00	50.00	50.00
Soya bean	18.10	9.00	10.00	10.00	10.00	10.00
SOSM	-	20.00	20.00	20.00	20.00	20.00
Grounnut cake	7.00	7.1	7.10	7.10	7.10	7.10
Fishmeal	6.00	6.00	6.00	6.00	6.00	6.00
Maize offal	16.00	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.15	0.15	0.15	0.15	0.15	0.15
Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis						
Protein (%)	19.26	18.32	18.17	18.12	18.21	18.47
*Energy (Kcal/Kg)	3159.06	2900.50	2900.00	2912.00	2903.00	2906.00
Fibre (%)	4.00	4.72	4.71	4.72	4.70	4.68
Calcium (%)	1.25	1.26	1.25	1.26	1.26	1.26
Phosphorus (%)	0.81	0.81	0.82	0.82	0.82	0.82

*Metabolizable energy (ME) calculated according to the formula of Pauzenga, (1985) ME= 37 × % CP + 81× % EE + 35.5 × % NFE, SOSM = *Senna obtusifolis* seed meal, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifoli* Seed meal, SKSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

Table 2: Ingredient Composition and Calculated Analysis of the Experimental Growers Mash

Level of soyabean meal replaced with 20% each of the raw and processed SOSM						
Ingredient	**T1 (0% SOSM)**	**T2 (20% RSOSM)**	**T3 (20% BSOSM**	**T4 (20% SkSOSM)**	**T5 (20% SPSOSM)**	**T6 (20% FSOSM)**
Maize	54.00	54.00	54.00	54.00	54.00	54.00
Soya bean	17.00	7.00	7.00	7.00	7.00	7.00
SOSM	-	20.00	20.00	20.00	20.00	20.00
Grounnut cake	6.10	6.10	6.10	6.10	6.10	6.10
Fishmeal	5.00	5.00	5.00	5.00	5.00	5.00
Maize offal	15.0	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.15	0.15	0.15	0.15	0.15	0.15
Premix*	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis						
Protein	17.34	16.67	16.58	16.75	16.82	16.97
Energy**	3174.68	3016.22	3016.22	3016.22	3016.22	3016.22
Fibre	4.69	5.12	4.81	4.79	4.82	4.57
Calcium	1.13	1.24	1.24	1.23	1.24	1.24
Phosphorus	0.78	0.80	0.80	0.80	0.80	0.80

*Metabolizable energy (ME) calculated according to the formula of Pauzenga, (1985) ME= 37 × % CP + 81× % EE + 35.5 × % NFE, SOSM = *Senna obtusifolis* seed meal, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifoli* Seed meal, SKSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

Experimental stock and their management

Two hundred and sixteen (216) cockerel chickens were used for this experiment. The Two hundred and sixteen (216) cockerel chicks were used for the experiment which lasted for sixteen (16) weeks. The cockerels were managed on deep litter pens of 12 birds/2.22 M^2 and were vaccinated against Gumboro (2 and 4 weeks of age), Newcastle disease (3 and 5 weeks of age), fowl pox vaccine (8 weeks of age) and komorov (10 weeks of age). The experimental diets and water were fed *ad-libitum* to the cockerels throughout the experimental period respectively.

Experimental design

The 216 cockerels were randomly allotted to the six dietary treatments in a randomized complete block design (RCBD) with pen location serving as the blocking factor. Each treatment group was replicated three times with 12 chickens per replicate pen.

Collection of blood samples

At the end of the experiment, three (3) birds were randomly selected from each replicate pen and used for blood collection. About 7 ml of blood samples for haematological analysis were collected after decapitation in ethylene diamine tetra acetic acid (EDTA) treated tube. The blood collected was used for haematological assay. The blood samples for biochemical analyses, on the other hand, were collected into an EDTA–free test tube and allowed to clot for serum separation. Serum was separated from the plasma by centrifugation of the blood at 4000 rpm for 15 minutes and thereafter quickly taken to the Laboratory for analyses. The haematology and blood chemistry analyses were carried out according to the procedure of Ochei, and Kolhatkar (2000).

Parameters measured

Data were collected on packed cell volume (PCV), haemoglobin (Hb), red blood cell count (RBC), white blood cell count (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), Total protein, albumin, globulin, cholesterol, creatinine, alkaline phosphatase, aspartate amino transferase (AST) and alanine amino transferase (ALT).

Statistical analysis

Data collected were subjected to analysis of variance (ANOVA) of the Randomized Complete Block Design (RCBD) using Statistix 9.0 (Statistix 2003). Least Significant Difference (LSD) was used to

separate the treatment means where significant differences occured. Significant difference was considered at 5% level of probability.

Results and Discussion

The proximate compositions of the experimental diets are presented in Tables 3 and 4. The crude protein and energy contents of the experimental diets (17.48 – 18.11%) and (2700 – 2826.10 kcal/kg) for the chick mash and (15.95 – 17.22%) and (2902.25 – 3201.63 Kcal/kg/) for the growers mash are adequate to meet the nutritional requirements of cockerels at both stages of growth. The protein contents of the diets are within the range (16 -17%) recommended by Olomu (2011) but the energy values of the diets are higher than the range (2650 – 2700 kcal/kg) reported by Ganiyu (2005) for growing cockerels in the tropics. The processed *Senna obtusifolia* seed meal based-diets were observed to have low levels of tannins and total phenolics components with the fermented seed meal based-diet having the lowest level of anti-nutrients.

The results for Haematological Parameters of cockerels fed raw and processed *Senna obtusifolia* seed meal (SOSM) are presented in Table 5. The haematological indices of cockerels fed raw and the processed *Senna obtusifolia* seed meal were not (P>0.05) influenced by the dietary treatments except for the mean corpuscular volume (MCV). However, packed cell volume (PCV), haemoglobin (Hb) concentration and red blood cells (RBC) count of the cockerels fed the raw and processed *Senna obtusifolia* seed meal were lower than the normal range (35.9 – 41.0%, 11.60 – 13.68 g/dl and 4.21 – 4.84×10^6 /mm^3) reported by Wikivet (2015) for domestic chickens.

Table 3: Analysed Chemical Composition of Experimental Chick Mash

Level of inclusion of *Senna obtusifolia* seed meal						
Nutrients (%)	**T1(0%SOSM)**	**T2(RSOSM)**	**T3BSOSM)**	**T4(SKSOSM)**	**T5(SPSOSM)**	**T6(FSOSM)**
Dry matter	93.25	91.33	92.58	91.75	93.01	93.66
Crude protein	18.05	17.48	17.77	18.11	18.09	18.05
Fibre	5.01	6.33	5.97	5.63	6.72	5.69
EE	11.21	13.09	14.20	12.71	10.22	11.37
Ash	8.11	7.09	9.28	7.89	10.36	9.78
NFE	35.22	31.72	32.18	31.96	31.77	31.09
**Energy (kcal/kg)	2826.17	2833.11	2950.08	2834.89	2862.85	2700.00
Tannins	0.00	0.67	0.36	0.41	0.38	0.33
TP	0.00	0.92	0.78	0.64	0.62	0.67

**Metabolizable energy (ME) calculated according to the formula of Pauzenga, (1985) ME =37 × % CP + 81× % EE + 35.5 × % NFE, TP = Total phenolics, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifolia* Seed meal, SSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

Table 4: Analysed Chemical Composition of Experimental Growers Mash

Level of inclusion of *Senna obtusifolia* seed meal						
Nutrients (%)	**T1(0%SOSM)**	**T2(RSOSM)**	**T3BSOSM)**	**T4(SKSOSM)**	**T5(SPSOSM)**	**T6(FSOSM)**
Dry matter	92.50	92.00	92.08	91.55	92.31	91.66
Crude protein	16.35	16.00	15.95	17.22	16.35	16.68
Fibre	6.08	7.21	6.75	7.04	5.98	6.02
EE	16.28	15.00	14.25	14.58	15.09	14.77
Ash	7.85	6.69	8.35	8.55	7.95	8.33
NFE	36.00	32.70	33.00	31.68	34.77	31.21
**Energy kcal/kg	3201.63	2968.91	2915.90	2942.76	2961.59	2902.25
Tannins	0.00	0.55	0.39	0.50	0.30	0.29
TP	0.00	0.81	0.70	0.80	0.66	0.67

**Metabolizable energy (ME) calculated according to the formula of Pauzenga, (1985) ME = × % CP + 81× % EE + 35.5 × % NFE, TP = Total phenolics, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifolia* Seed meal, SSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

Table 5: Haematological Indices of Cockerel Chickens Fed Raw and Processed *Senna obtusifolia* seed meal

Level of inclusion of *Senna obtusifolia* seed meal							
	T1 (0% SOSM)	T2 (20% RSOSM)	T3 (20% BSOSM)	T4 20% SKSOSM	T5 (20% SPSOSM)	T6 (20% FSOSM)	SEM
PCV (%)	24.50	27.70	23.10	23.01	23.50	24.19	2.90^{NS}
Hb (g/dl)	7.94	8.09	7.86	7.30	7.20	7.62	0.87^{NS}
RBC ($x10^6$)/ml	2.07	2.38	2.45	2.79	2.17	2.37	0.23^{NS}
WBC ($x10^6$)/ml	2.43	2.43	2.30	2.34	2.30	2.50	1.03^{NS}
MCV (Fl)	128.01^a	116.39^b	94.29^b	78.88^b	112.90^b	113.50^b	1.30*
MCH (pg)	43.96	33.90	32.08	34.97	33.17	36.67	1.04^{NS}
MCHC (%)	32.41	29.21	34.03	30.86	30.63	31.50	1.90^{NS}

a,b,c = means in the same row with different superscripts are significantly different (P<0.05)
* = Significant at 5% level of probability, NS = Not significant, SEM = Standard error of the means, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Haemoglobin, MCHC = Mean corpuscular Haemoglobin Concentration, RBC = Red blood cells, WBC = Red blood cells, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifolia* Seed meal, SSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

The serum biochemical indices (Table 6) indicated that total protein and albumin were significantly (P<0.05) influenced by the dietary treatments. The total protein of cockerels fed the positive control diet (0% SOSM) was significantly (P<0.05) higher than those fed the raw and processed SOSM. However growing cockerels fed the fermented, sprouted and boiled SOSM based-diets recorded similar total protein which was significantly (P<0.05) higher than the chickens fed raw and soaked *Senna obtusifolia* seed meal based-diets. This may be due to high concentration of anti-nutrients present in the raw and soaked seeds. The decreased in total protein in the growing cockerels fed diets containing raw and soaked *Senna obtusifolia* seed meal might be due to the inhibition of protein utilization caused by anti-nutritional factors. This finding is consistent with the report of Liener (1994) who reported that tannins and total free phenolics can decrease digestibility of protein. The improvement in the serum total protein of cockerels fed the fermented, boiled and sprouted *Senna obtusifolia* seed meal based-diets indicates the effectiveness of the processing methods in detoxifying the toxic components of SOSM. The total protein of the chickens fed raw and soaked *Senna obtusifolia* seed meal based-diets are lower than the normal range (4.63 – 4.85 g/dl) reported by Wikivet (2015). The serum uric acid levels of the cockerels were significantly (P<0.05) higher in the groups fed the raw and sprouted *Senna obtusifolia* seed meal based-diets than the other groups.

Table 6: Biochemical Indices of Cockerel Chickens Fed Raw and Processed *Senna obtusifoila* Seed Meal

Level of inclusion of *Senna obtusifolia* seed meal							
	T1 0% SOSM	T2 20% RSOSM	T3 20% BSOSM	T4 20% SKSOSM	T5 20% SPSOSM	T6 20% FSOSM	SEM
Total protein (g/dl)	4.78^a	2.42^c	3.94^{ab}	2.82^c	2.20^c	3.87^{ab}	0.19*
Albumin (g/dl)	3.08^a	1.40^c	2.75^b	1.73^c	1.20^c	2.68^b	0.15*
Globulin (g/dl)	1.70	1.02	1.19	1.09	1.00	1.19	0.18^{NS}
Uric acid (mmol/l)	1.50^c	3.06^a	2.32^b	3.99^a	2.51^b	2.35^b	0.81*
Cholesterol (mg/l)	39.45^a	14.35^d	21.25^c	19.75^c	20.66^c	28.05^b	1.04*
Creatinine (mmol/l)	1.88	1.80	1.77	2.03	2.08	1.95	0.31^{NS}
Calcium (mmol/l)	4.11	3.90	4.00	4.60	4.25	4.60	0.44^{NS}
Phosphorus (mmo/l)	3.20	3.31	2.95	3.11	2.95	3.68	0.81^{NS}
ALKP	61.83^c	98.86^a	67.12^c	77.90^b	72.22^b	64.05^c	12.62*
AST (U/l)	7.10^b	14.09^a	9.35^b	8.27^b	7.38^b	7.92^b	0.25*
ALT (U/l)	2.00^c	7.20^a	4.31^b	5.21^b	4.03^b	3.66^c	0.13*
Total biluribin (mmo/l)	6.59^c	13.41^a	9.78^b	10.50^b	4.03^b	3.66^c	0.13*
CB (mmol/l)	3.01^c	6.69^a	4.86^b	5.36^b	5.78^b	3.54^c	0.51*

a,b,c,d= means in the same raw with different superscript are significantly different (P < 0.05), NS = non significant, SEM = standard error of means, AST = aspartate amino transferase, ALT = alanine amino transferase, CB = conjugated bilirubin, RSOSM = Raw *Senna obtusifolia* Seed meal, BSOSM = Boiled *Senna obtusifolia* Seed meal, SSOSM = Soaked *Senna obtusifolia* Seed meal, SPSOSM = Sprouted *Senna obtusifolia* Seed meal, FSOSM = Fermented *Senna obtusifolia* Seed meal

Rise in uric or urea levels are linked to poor protein quality and utilization. The higher concentration of anti-nutritional factors in the raw seed meal and residual anti-nutritional factors in the sprouted seed meal might have been responsible. Abiola *et al*. (2001) further buttressed this finding by reporting that increase in urea concentration is an indication of poor protein quality. Reed *et al*. (1995) pointed out that tannins in feed can cause low protein utilization.

The cholesterol levels of the cockerels fed the dietary treatments revealed a significant ($P<0.05$) differences among the treatments groups. cockerels fed 0% and fermented *Senna obtusifolia* seed meal based-diets showed significantly ($P<0.05$) higher levels (28.05 mg/l) than the other treatment groups. This is due to the reduction of the phytochemicals such as tannins, phytates and oxalates through boiling and fermentation methods adopted. Anti-nutritional factors have been reported to reduce fats and cholesterol levels in tissues (Zunft *et al*., 2003). The possible cholesterol lowering effect was contributed by the presence of higher anti-nutritional factors in the raw, soaked and sprouted seeds. The cholesterol values which ranged from 4.35 – 28.05 g/dL is lower than the value (89.78 mg/dL) reported by Isidahomen *et al*. (2011) who fed sorrel seed meal based-diets to broiler chickens.

The result for the serum alkaline phosphatase, hepatic enzymes, (alanine amino transferase and aspartate amino transferase) showed significant variations with elevated values in the group fed RSOSM based-diets also presented similar pattern and attributes as that of alkaline phosphatase. This indicates that the cockerels fed the raw seed meal based-diet might have suffered from liver disfunction. However, cockerels fed 0% SOSM, boiled and fermented seed meals based-diets recorded lower alkaline phosphatase, alanine amino transferase and aspartate amino transferase values. This revealed that the boiling and fermentation methods were very effective in detoxification of the seed meal which resulted to better liver functions. This is because lower values of serum enzymes are indication of normal liver function.

The values for total and conjugate billirubin of the cockerels fed the experimental diets were significantly ($P<0.05$) affected. The cockerels fed raw, soaked and sprouted *Senna obtusifolia* seed meals recorded higher ($P<0.05$) values indicating liver disfunction. This is in line with the report of Howard (2009) who observed that high levels of billirubin in the blood are a reflection of liver damage and disfunction. This might be connected to the adverse effects of residual anti-nutritional factors present in the soaked and sprouted *Senna obtusifolia* seed meal based-diets. The lower levels of billirubin in the cockerels fed the boiled and fermented seed meal based-diets revealed the superiority of these processing methods and their effectiveness in reducing the levels of anti-nutritional factors present in raw Senna obtusifolia seed meal.

Conclusion

The findings of this study revealed that haematological parameters of cockerels fed the raw and processed *Senna obtusifolia* seed meal were not significantly affected by the experimental diets except for the mean corpuscular volume (MCV). However, haematological values recorded were lower than the normal reference ranges. The biochemical indices of the cockerels fed raw, soaked and sprouted *Senna obtusifolia* seed meal were adversely affected with only those fed the boiled and fermented seed meal indicated little or no deleterious effects on the biochemical parameters. However, those fed the fermented seed meal showed better biochemical indices and therefore the fermented *Senna obtusifolia* seed meal is recommended for feeding cockerels.

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