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Haematological Characteristics and Organ Weights of Rabbits Fed *Alchornea Cordifolia* Leaf Meal

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ABSTRACT: Sun-cured *Alchornea cordifolia* leaf meal was administered into the diet of 7-8 weeks old rabbits to determine the effect(s) on haematological parameters (PCV, RBC, WBC, Hb, MCV, MCH and MCHC) and organ weights. Twenty four (24) individually caged mixed rabbits (Dutch-Belted, New Zealand White, Chinchilla and crosses) were randomly allocated to four treatments comprising a control (without *Alchornea cordifolia* leaf meal) and three diets contains 5g, l0g and 15grames/kg feed of *Alchornea cordifolia* leaf meal constituting treatment A (control) B, C and D respectively in a completely Randomized Design. Each treatment comprised 6 rabbits with two (2) animals per replicate having 3 males and 3 females. Results obtained showed that the administration of *Alchornea cordifolia leaf* meal does not have negative effect on haematological parameters examined, but had significant ($p<0.05$) negative effect on the liver, kidney and heart of rabbits fed *Alchornea cordifolia* Leaf meal except the spleen and gonads. The study demonstrated that *Alchornea cordifolia* leaf meal up to 5-15g/kg feed should not be incorporated in the diet of rabbits as it may cause dysfunctioning of the vital organs of the animals.

***Keywords*:** *Alchornea cordifolia*, Leafmeal, Rabbits, haematology, Organs, Gonads

INTRODUCTION

In most developing countries, the search for non-conventional feed additives to replace or promote the efficient utilization of the expensive synthetic conventional feed appears to occupy the attention of animal scientist (Alikwe and Owen, 2014, Alikwe, 2013, Alikwe and Omotosho,2013). The aim of using them as feed additives is to reduce the cost of production, enhance health status, promote growth and increase reproductive performance of the animal, thus making it possible for poor people to afford animal protein (Ojebiyi, 2006). Feeds which constitute up to 70% of the total cost in monogastric production are major limitation to the expansion of the livestock industry.

Alchornea cordifolia Schum and Thorn (Family Euphoribiaceae) is a shrub found along the coastal areas of West Africa. According to Nyananyo, (2006), *Alchhornea cordifolia* is a straggling shrub or small tree occurring in swampy or dry land. The leaves are simple, ovate, basically cordate, acuminate with sessile glands at the base close to the petiole. The flowers are greenish white. Udedibie and Opara (1998); Okoli, (2003) indicated that the leaves are cherished by ruminants and are used by subsistence farmers who harvest them for their livestock while Alikwe (2014a, 2014b, 2014c, 2014d) have used the dried leaf meal to feed rabbits and Snails with good results, but there was deterioration in the performance of Broilers birds and Wistar rats that fed on the leaf meal.

Growth promoters that contain androgens or growth hormone, have an anabolic effect and so promotes weight gain (Ogbangba, 2002). *Alchornea cordifolia* also has been found to cause hypertrophy of the gonads in birds which signifies increased testosterone production (Wekhe and Njoku, 2000). A similar report by Timibitei (2014), Timibitei, (2013), Timibitei and Wekhe (2006) showed linear hypertrophy of testes and atrophy of ovaries of rabbits fed *Alchornea cordifolia* parts with no negative effect on some visceral organs such as liver, kidney and heart.

Rabbits, apart from its reported proficiency in reproduction have other advantages over many other farm species including high quality protein, much lower fat*/*cholesterol and steady source of income (Fielding, 1991). Rabbits because of its obvious advantage over other livestock are animal that can efficiently ameliorate the problem of animal protein shortage in developing countries (Cheeke, 1986; Olabanji*,* 2009). Rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria. This is as a result of its good attributes which include high feed efficiency, short gestation period, high prolificacy, relatively low cost of production, high nutritional quality of rabbit meat and ability to digest large amount of fibrous feed in diet (Fielding, 1991; Taiwo, 1999).

The presence of caecal microbes enables the rabbit to digest large amounts of fibrous feed as most non-ruminant species cannot (Taiwo*,* 1999). Rabbits do not necessarily take in high fibre feed material under natural conditions (Spreadbury, 1978). Some percentage (18%) digestibility of crude fibre has been suggested by different researchers (Slade and Hintz, 1969). Due to this unique attribute, they practice *caprophagy*(eating of early morning faeces) for effective utilization of the digested forage (Thompson and Wordan, 1956; Fielding, 1991).

Blood is a readily available and fast means of assessing clinical and nutritional status of the animal on feeding trial through the use of blood analysis. (Olabanji*,* 2008) and organ characteristics (Ewuola, 2009). Since the assessment of the health status of the animal is paramount to the producer. Young rabbits according to Gardner (1947), has lower erythrocytes than adult rabbits. Ary and Goel; (1992) observed that the red blood cell of rabbits can survive in buffalo serum otherwise called " Alternate complement pathway activity" . They also observed variation in the RBC of male and female horse.Research on other parts of *Alchornea* (root bark, seed and pod husk) showed no negative effect on blood, organ and hormones of rabbits. (Timibitei, (2014), Timibitei, (2013)Timibitei and Wekhe, 2006). Thus, the study was focused on determining the effect of *Alchornea cordifolia* leaf meal on haematological characteristic, gonads and visceral organs of male and female rabbits

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MATERIALS AND METHODS

This study was carried out at the Rabbitry unit of the Teaching and Research farm of Niger Delta University, Amassoma, Bayelsa State, Southern Nigeria in which twenty four, 7-8 weeks old rabbits of mixed sex comprising Dutch-belted, New Zealand White, Chinchilla and crosses and weighing 0.96kg on the average were used. All animals were pre-conditioned for two weeks in the rabbitry unit in hutches and were dewormed with Ivomec® -and administered antibiotics such as coccidiosta® powder thorough drinking water. They were randomly allocated to each treatment for feeding trials of 6 weeks and were given feed and water *ad libitum* withthe same management practice.

The proximate composition, mineral content and phyto-chemical composition of the ACLM is presented in Tables 1 – 3, while Table 4 list the composition of the diet used for this study.

Data Collection

At the end of the experiment, four rabbits comprising two bucks and two does per treatment were scarificed and blood samples (2mls each) per animal were collected into a set of sterilized glass bottle containing EDTA (ethyheme diamine tetra acetic acid) for determination of haematological parameters at Federal Medical Centre Yenagoa, Bayelsa State.

Post mortem examination of the gonads and organs of the slaughtered rabbits was done for lesions and weighed on an electronic balance.

Haematology

PCV (Packed Cell Volume):

The PCV was determined using the Wintrobe haematrocrit method (Wintrobe, 1933).

WBC (Red Blood cell), RBC (Red Blood Cell) and Platehets:

WBC, Platelets and RBC were determined using Neubauer haemacytometer after the appropriate dilution (Cheesbrough, 2000).

Haemogbobin (Hb):

Haemogbobin was measured by hemcue-non-dilution photometric technique (Cheesbrough, 2000).

Erythrocyte Indices:

The Mean Corpuscular volume (MCV), Mean Corpuscular Haemogbobin (MCH) and Mean Corpuscular Haemogbobin Concentration (MCHC) were calculated as shown below:

$$MCV(FL) = \frac{PCV\ (\%)\ x\ 10}{RBC\ x\ 10^{12}/L}$$

$$MCH(Pg) = \frac{Haemogbobin\ (xg/dL)}{RBC(10^{12}/L)}$$

$$MCHC(\%) = \frac{Haemogbobin\ (g/dL)\ x\ 100}{PCV\ (\%)}$$

Statistical Analysis

The results were subjected to analysis of variance according to Steel and Torrie (1980), while treatment means were compared using Duncan's multiple range test (SAS, 2000)

Table 1. Proximate Composition ACLM (%)*

Moisture	9.96±0.40
Total fat	4.340±0.23
Fatty acid	3.47±0.24
Crude proteins	17.94±0.40
NFE	43.53±0.21
Total ash	11.38±0.26
Crude Fibre	12.85±0.16
Energy (Kcal-g)	3.367

Each value represents means±standard deviation of three replicate determinations * Alikwe and Owen (2014)

Table 2. Mineral contents of ACLM*

Element Content	(mg/kg)
Calcium	288
Magnesium	22
Potassium	7.25
Cobalt	40
Manganese	58.35
Iron	192.5
Copper	32.5

Each value represents means±standard deviation of three replicate determinations *Alikwe and Owen (2014)

Table 3. ACLM Phytochemical and Anti-Nutrients*

(Water extract)	Qualitative	Quantitative (%)
Alkaloids	-	
Anthraquinones	-	
Flavonoids	-	
Cardiac glycosides	+	0.11
Saponins	+	2.04
Steroids	-	
Tannins	-	
Triterpenoids	-	
Phenols	+	1.16
Anti-Nutrients		
Phytate	+	1.21
Oxalate	+	0.86
HCN	+	22.3mg-kg

+ = Present, - = AbsentEach value represents means±standard deviation of three replicate determinations *Alikwe and Owen (2014)

Table 4. Ingredients composition of the Diets and dietary levels of ACLM 0.0% 5.0% 10.0%15.0%

Maize		43.0	43.0	43.0	43.0
SBM	17.0	12.0	7.0	2.0	
ACLM	0.0	5.0	10.0	15.0	
Palm kernel meal	12.0	12.0	12.0	12.0	
Wheat offal		15.0	15.0	15.0	15.0
Crayfish meal	3.0	3.0	3.0	3.0	
Bone meal		7.0	7.0	7.0	7.0
Oyster shell		2.0	2.0	2.0	2.0
Salt	0.50	0.50	0.50	0.50	
Premix	0.50	0.50	0.50	0.50	
Total		100	100	100	100
Calculated					
Crude Protein	18.0	16.7	15.4	14.1	

RESULTS AND DISCUSSION

Table 5. Haematological Values of Rabbits Fed *Alchornea cordifolia* Leaf Meal (Mean + SEM)

		Treatment				
Parameters	Sex	A(control)Og/kg feed	B(5g/kg feed)	C(10g/kg feed)	D(15g/kgfeed)	I Level of Significant
PCV(%)	Male	42.00+5.32	44.00+5.32	56.00+5.32	30.00+5.32	N.S
	Female	55.00+6.45	51.00+6.46	26.00+6.46	41.00+6.46	N.S.
WBC(10^{12}/L)	Male	4.30+1.15	7.30+1.15	7.20+1.15	•2.60+1.15	N.S.
	Female	9.80+1.4S	7.60+1.49	3.10+1.49	4.70+1.49	N.S
RBC(10^{12}/L)	Male	4.50 + 0.43	4.90 + 0.43	5.30 + 0.43	3.30 + 0.43	N.S
	Female	5.90 + 0.68	5.10 + 0.68	2.70 + 0.68	4.40 + 0.68	N.S
Platelets(10^{s}/L)	Male	469.00 + 20.57	414.00 + 20.57	507.00 + 20.57	494.00 + 20.57	N.S
	Female	504.00 + 20.51	422.00 + 20:51	513.00 + 20.51	485.00 + 20.51	N.S
HB (g/L)	Male	10.10+1.34	12.60+1.34	13.00+1.34	7.20+1.34	N.S
	Female	12.80+1.57	12.30+1.57	5.90+1.57	10.30+1.57	N.S
Neutrophils	Male	17.00+1.32	18.00+1.32	16.00+1.32	12.00+1.32	N.S
	Female	31.00+14.01	38.00 + 4.01	19.00 + 4.01	26.00 + 4.01	. N.S
Lymphocytes	Male	75.00+1.42	76.00+1.42	80.00+1.42	81.00+1.42	N.S
	Female	60.00 + 3.82	62.00+3.82	77.00 + 3.82	68.00 + 3.82	N.S

S.E. - Standard Error of Mean N.S- Not Significant (p >0.05).

Table 6. Erythrocyte Indices of Rabbits Fed *Alchornea Cordifolia* Leaf Meal

			treatment			
Parameters	Sex	A(control)	B (5%)	C (10%)	D(15%)	LOS
MCV(FL)	Male	93.30 +3.47	89.90+ 13.47	105.00+3.47	91.00+3.47	N.S
	Female	96.60+1.83	102.00+1.83	96.30+1.83	93.20+1.83	N.S
MCH(Pg)	Male	24.70+1.40	23.90+1.40	24.50+1.40	-21.00+1.40	N.S
	Female	21.70 + 0.96	24.10+0.95	21.90 + 0.95	25.70 + 0.95	N.S
MCHC(%)	Male	24.10 + 0.70	23.80+0.70	23.80 + 0.70	21.00 + 0.70	N.S
	Female	22.50 + 0.61	24.10 + 0.6'	22.70 + 0.61	26.10 + 0.61	N.S

S.E. - Standard Error of Mean N.S Not Significant (P> .005)

Table 7. Organ Weights of Rabbits Fed *Alchornea cordifolia leaf meal*,

				Treatment		
Parameters	Sex	A(control)	B(5%)	C(10%)	D(15%)	Level of Significance
Liver	Male	38.50^{b} + 2.50	35.00^{ab}+4.00	34.00^{ab}+0.00	27.00^{a}+0.0	P<0.05
	Female	42.00^{c} + 2.00	36.50^{b} + 0.50	34.00^{b} + 0.00	22.50^{a}+1.50	P<0.05
Kidney	Male	9.00^{b}+1.00	8.00^{b}+1.00	6.00^{s} +0.00	6.00^{a} + 0.00	p<0.05
	Female	9.00^{b}+1.00	9.00^{b}+1.00	7.00^{b} + 0.00	4.00 + 0.009	P<005
Heart	Male	4.00^{b} + 0.00	3.50^{b} + 0.50	3.00^{ab} + 0.00	2.25^{a} + 0.25	P<.005
	Female	4.00 + 0.00	3.0.0jt0.00	3.00 + 0.00	3.00 + 0.00	N.S
Spleen	Male	0.10 ±0.00	0.20 + 0.00	0.10 + 0.00	0.20^{a} + 0.00	N.S
	Female	0.20 + 0.00	0.10 + 0.00	0.20 + 0.00	0.20 + 0.00	N.S
Testis	Male	0.20 + 0.00	0.20 + 00	0.30 + 0.00	0.10 + 0.00	N.S
Ovary	Female	0.10±0.00	0.20±0.00	0.20 ± 0.00	0.20 ± 0.00	NS

Abe : Means along the same row with different superscripts are significantly different (p<0.05) E.F = Standard Error of Mean N.S = Not Significant

Result did not show significant differences ($p<0.05$) in all haemetological values obtained for both males and females (Tables 5 and 6). But the values of PCV, WBC RBC, HB and Neutrophils observed were linearly lower in males in treatments (B-C) feed than control, while fluctuations were noticed in females. The same pattern was also observed for MCV, MCH and MCHC for both males and females. Table 7 presents the value obtained from the weight of the visceral organs and gonads examined. Results revealed that there was significant differences ($P<0.05$) in the weights of the liver, kidney and heart, whereas there was no difference ($P>0.05$) in the weight of the spleen, testis and ovaries.

Discussion

Haematological Para meters/Erythrocyte Indices

Haematological values were found not significantly different ($P>0.05$) in all parameters measured. PCV, WBC, HB were all within the reported range (Mitruska, and Rawnsley,1977). These results thus, indicate that the blood values of both male and female rabbits were not negatively affected by the ingestion of *Alchornea cordifolia* leaf meal These results suggests that the defensive system of the rabbits, were not affected negatively and erytrogenesis was also not altered. It further indicated efficient oxygen transport system and normal haematopoiesis (Blood, 1979). *Alchornea cordifolia* leaves have been used as anti-bacterial (Dalziel, 1956; Gbile and Adesina, 1986; Le Grand and Wondergem, 1987; Kambe, 1990; Macfoy, 1990; Ogungbamila and Samuelson, 1999) anti-fungal (Abo and Ashidi, 1994) and anti-inflammatory (Osadebe and Okoye, 2003) and anti-viral (Ayisi and Nyadezor, 2003). It also shows that sex/breed difference did not have a significant role in haematological parameters as observed by Casey, (1934) and It also agree with that of Timibitei, (2014), Timibitei, (2013), Timibitei and Wekhe (2006) who recorded no negative effect in rabbits fed graded levels of different parts of *Alchornea cordifolia* parts.

Organ Weight

The result showed that liver weight decreased significantly ($p<0.05$) as the level of *Alchornea cordifolia* leaf meal increases. This could probably be due to destruction of hepatocytes induced by toxin (anti-nutritional factors) as reported by Seifert, (1992) that alkaloids in most animal species cause chronic lesions of the liver and kidney and damage lungs. It also confirms the report of anti-nutrition effectof *Alchornea cordifolia* seed in animals as reported by (Udedibie and Nwaiwu, 1988. Lamikanra, 1990; Ebi, 2001). The significant ($p<0.05$) reduction in kidney weight in both sexes and the heart weight in males noticed could be associated with dysfunction of the organs in question due prolonged intake of the leafmeal which is regarded as a broad spectrum natural antibiotic. The gonad weight could be an indication that *Alchornea cordifolia* leaf may not have a negative effect on fertility of growing rabbits. This report agrees with that of Timibitei, (2014), Timibitei, (2013), Timibitei and Wekhe (2006) and Wekhe (2002) who observed no gross difference in the gonads of rabbits and organs of broilers fed *Alchornea cordifolia* parts and root barks respectively.

Conclusion and Recommendation

Alchornea cordifolia leaf meal does not have deleterious effect on haemotological parameters and gonads of growing rabbits; but cause a slight significant ($p<0.05$) reduction of the liver, kidney and heart weight of the rabbits. *Alchornea Cordifolia* leaf meal may not be used to feed rabbits since it is observed to cause a slight decreased in the liver, kidney and heart of rabbit. Lower levels less than 5% may be used as a feed additive in subsequent studies to further test the effect of *Alchornea cordifolia* leaf in the blood and gonads of adult rabbits.

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