IN VIVO TREATMENT OF COCCIDIAL ORGANISMS USING ETHANOLIC EXTRACT OF RIPE PAWPAW (*Carica papaya*) SEEDS AND ITS EFFECT ON GROWTH PERFORMANCE AND HAEMATOLOGY OF BROILER CHICKENS.

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DOI: 10.5281/Zenodo.14904227

ABSTRACT
The study was carried out to assess the anticoccidial effect of ethanolic extract of ripe pawpaw (*Carica papaya*) seeds in the treatment of coccidial organisms in broiler chickens under natural infection. A total of 150 (day-old chicks) were randomly divided in 5 treatments (containing 3 replicates with 10 birds per replicate). The infected birds were administered dosage levels of ethanolic extract concentrations of 0g (amprolium), 2g, 3g, 4g, and 5g/ litres of drinking water for a period of eight (8) weeks, respectively. Data collected were analyzed using analysis of variance (ANOVA). The phytochemical constituents of the extracts revealed the presence of alkaloids, cardiac glycosides, flavonoids, oil, protein, reducing sugar, saponins, tanins and terpenoids, The results of this experiment showed significant difference ($P < 0.05$) in the final body weight, survivability of the birds and significant reduction of the oocysts in the faecal samples of the birds across the treatments. Birds with highest levels of EERPS showed best result in the final Body weight and had low mortality and oocyst count which is close to those obtained in those treated with amprolium (T1). There was no significant difference ($P > 0.05$) in the haematological parameters except the red blood cells (RBC). Thus, ethanolic extract of ripe pawpaw (*Carica papaya*) seeds can serve as an alternative to synthetic anticoccidial drugs in the prevention and control of coccidiosis in chickens.

Keywords: ethanolic extract, oocysts, survivability, anticoccidial and natural infection

Table 1: Proximate Analysis of Ethanolic Extract of Ripe Pawpaw (*Carica papaya*) Seeds (EERPS)

Parameters	Quantity(%)
Moisture content	30.67
Ash content	5.33
Crude protein	1.56
Ether extract	56.83
Nitrogen free extract	7.17

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Table 2: Proximate Composition of the Experimental Diets

Parameters	Starter(%)	Finisher(%)
Moisture content	8.90	7.48
Ash content	6.14	5.38
Crude fibre	4.72	5.33
Crude protein	23.61	20.48
Ether extract	7.21	8.33
Nitrogen free extract	49.42	53.00
Energy (kcal/kg)	3168.90	3279.85

Table 3: Growth Performance of Broiler chickens administered Varying Levels of Ethanolic Extract of Ripe Pawpaw (Carica papaya) Seeds (EERPS)

The results of the effect of administering varying levels of ethanolic extract of ripe pawpaw seeds (EERPS) on the growth performance of broiler chickens presented in table 3, showed that it had no effect ($P>0.05$) on all the growth parameters measured except the final body weight, Mortality and final oocysts count. Broiler chickens in T_1(control), T_3(3g), T_4(4g) and T_5(5g) had similar ($P>0.05$) final body weight values except birds in T_2. However, chickens on T_1(control) and T_5(5g) had higher ($P<0.05$) final body weight and body weight gain values than those birds in T_2(2g), T_3(3g), and T_4(4g). The mortality rate and examination of coccidial oocysts in faecal samples of broiler chicken showed that administering varying levels of EERPS to broiler chickens had significant effect ($P>0.05$) on the mortality rate and oocysts values. Birds in treatment group T_3(3g), T_4(4g) and T_5(5g)] had similar ($P>0.05$) mortality values and oocysts count values. However, birds in T_1(control) had lower ($P<0.05$) mortality values and finals oocyts count.

Table 4: Haematological Parameters of Broiler chickens administered Varying Levels of Ethanolic Extract of Ripe Pawpaw (*Carica papaya*) Seeds (EERPS)

The results of the effect of administering varying levels of ethanolic extract of ripe pawpaw seeds (EERPS) on the hematological parameters of broiler chickens are presented in table 4. the table showed that Ethanolic Extract of Ripe Pawpaw (*Carica papaya*) Seeds (EERPS) had significant effect ($P<0.05$) on RBC values only while WBC, PCV and HC were not influenced ($P>0.05$) upon EERPS administration to the birds.

Table 3: Growth performance of Broiler Chickens Administered Varying Levels of Ethanolic Extract of Ripe Pawpaw (*Carica papaya*) Seeds (EERPS)

Parameters	T1	T2	T3	T4	T5	SEM	P-Value	L/S
IBW	0.807	0.803	0.807	0.876	0.916	0.149	0.051	Ns
FBW	2.397^{ab}	2.263^{c}	2.370^{b}	2.373^{b}	2.420^{a}	0.148	0.00	*
WBWG	0.325	0.285	0.313	0.299	0.301	0.115	0.862	Ns
DFI	10.11	10.10	10.13	10.14	10.15	0.279	1.00	Ns
FCR	3.204	5.082	5.121	3.467	3.551	0.431	0.444	Ns
Mortality	6.67^{b}	20.00^{a}	16.67^{ab}	13.33^{ab}	10.00^{ab}	1.869	0.044	*
IOC	42.67	41.00	41.67	42.00	42.89	0.540	0.940	NS
FOC	10.67^{b}	20.67^{a}	18.17^{ab}	15.83^{ab}	14.17^{ab}	1.30	0.044	*

abc = Means on the same row having different superscripts are significantly different ($P<0.05$), SEM = Standard Error of Mean, LS = Level of Significance, T = Treatment, IBW = Initial Body Weight, FBW = Final Body Weight, WBWG = Weekly Body Weight Gain, DFI = Daily Feed Intake, FCR = Feed Conversion Ratio, IOC = Initial Oocysts Count, FOC = Final Oocysts Count, T1 = Control, T2 = 2g/litre, T3 = 3g/litre, T4 = 4g/litre, T5 = 5g/litre

Table 4: Haematological Parameters of Broilers Chickens Administered Varying Levels of Ethanolic Extract of Ripe Pawpaw (*Carica papaya*) Seeds (EERPS)

Parameters	T1	T2	T3	T4	T5	Ranges	SEM	P-Value	L/S
RBC(x10^{6}/ul)	4.344^{b}	4.256^{b}	5.167^{a}	4.511^{ab}	4.744^{ab}	2.5-3.5	0.118	0.044	*
WBC(x10^{10}/ul)	12.556	12.511	13.00	12.656	12.856	13-30	0.091	0.404	Ns
Hb(g/dl)	9.233	8.922	9.522	8.822	9.678	7-13	0.141	0.241	Ns
PCV(%)	27.89	26.33	29.06	26.61	29.09	22-35	0.460	0.165	Ns

ab = Means on the same row having different superscripts are significantly different ($P<0.05$), SEM = Standard Error of Mean, LS = Level of Significance, T = Treatment, RBC: Red Blood Cell, WBC: White Blood Cell, Hb: Haemoglobin Concentration, PCV: Packed Cell Volume

Discussion

The proximate composition of the experimental diets used in this study met the nutrient requirement of the starter (energy – 3168.90kcal/ kg and protein – 23.61 %) and finisher (energy – 3279.85kcal/ kg and protein – 20.48 %) broiler chicken diet as stated by NRC (1994).

The result obtained in the final body weight of birds administered ethanolic extract of ripe pawpaw (*Carica papaya*) seeds (EERPS) which shows that birds with the highest inclusion level of EERPS had the best result in terms of final body weight. The improvement in body weight could be a response to higher levels of pawpaw seeds administered to broiler birds and this agrees with findngs of (Muazu and Aliyu-Paiko, 2020), who stated paw paw extract increased feed intake and thereby growth performance of poultry birds. The result is also in agreement with the work of Okpe and Adamu (2022) who observed that broiler birds with the highest inclusion level

of paw paw leaf extract (75ml) had the best performance in terms of weight gain than other lower levels. Nghonjuyi *et al*. (2020) worked on varying levels of *C. papaya* seed extract on Kabir chicks at the rate of 480, 960, and 320mg/ kg and discovered that administration of *C. papaya* seed extract improved their body weight gain. The improvement in body weight observed in this work could also be as a result of improvement in gastro-intestinal condition and thus increased digestibility and nutrients utilization of the broiler birds (Nideou *et al*., 2017).

The mortality of the broiler chickens varies across the treament groups. As the level of EERPS increases, the survivability of the birds increases. However, birds in T_1 (control) had the best survival rate on administration of anticoccidial drug (Amprolium), followed by birds in T_5(5g) which had the highest inclusion level of EERPS. The antimicrobial, antihelminthic and antiparasitic activities of *C. papaya* seeds could most likely have improved the health conditions of the birds (Kadiri *et al*., 2016). This result is in agreement with the work of Banjoko *et al*. (2020) who reported the evaluation of varying levels of *Carica papaya* leaf as an anticoccidial for broiler chickens at the rate of 200, 400 and 600g/100kg of feed and discovered that administration of *Carica papaya* leaf meal improve the bird's survivability. The anti-inflammatory properties of *C. papaya* seed in caecal epithelial cells could be detrimental to coccodial reproductive activities (Dakpogan *et al*., 2019).

The oocysts count of coccidial organisms in the faecal samples of broiler chickens were significantly improved upon increase in the administration of EERPS across the treatment groups on a dose dependent basis. Though, Broiler chickens in T_1 (control) had the lowest egg count rate, there was decreasing egg count rate with increasing rate of EERPS across the treatment group. This could be as a result of the anticoccial activities of *C. papaya* seeds such as the presence of alkaloids, flavonoids, steroids, saponins, papain and terpenoids possessing antiparasitic activities (Masfufatan *et al*., 2019). This result is in agreement with the work of Banjoko *et al*. (2020) when varying levels of *Carica papaya* leaf as an anticoccidial for broiler chickens were administered at the rate of 200, 400 and 600g and reported effectiveness of *C. papaya* leaf in oocysts reduction. Similarly, *C. papaya* seed extract (at the rate of 480, 960 and 3200mg/ kg body weight) reduced faecal egg of *Ascaridia galli* in Kabir chicks in Cameroon. The presence of benyl isothiocyanate in *C. papaya* seed could be responsible for mitochodrial dysfunction of the parasites in chickens (Zhang and Chen, 2017).

The red blood cell count of broiler birds in this research showed significant differences ($p<0.05$) across the treatment but showed no trend in the pattern of distribution. Also the RBC count of broiler birds in all the treatment group tends to be above the normal range of RBC values. The result obtained in this work on haematological parameters most especially on the RBC contradicts the positive result obtained by other researchers like Bolu *et al*. (2009) ; Agboola *et al*. (2018) who reported normal ranges observed a trend with increase in the inclusion level paw paw extract.

The reasons for these variations might depend on multitude of factors among which includes the fact that most normal reference values were established in temperate countries, whose data may not effectively reflect tropical animal characteristics due to differences in environmental conditions as well as variations in the genetic make-up of the broiler chickens used for the study (Onunkwo *et al*., 2018).

Conclusion and Recommendation

This study concludes that Ethanolic extract of ripe pawpaw (*Carica papaya*) seed (EERPS) administered to broiler chickens could improve their final body weight gain, effectively inhibit coccidial organisms, reduce oocyst count and reduce mortality rate of broiler chickens. It is recommended that ethanolic extract of ripe pawpaw (*Carica papaya*) seed (EERPS) at 5g/litre of drinking water could be administered daily other than weekly for better result to broiler chickens to boost their immunity and without any deleterious effect on the bird and it consumers.

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