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Effect of Supplementation of *Carica Papaya* Seed Concentrate Diets on Performance and Faecal Egg Count of Village Managed Goats

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Target audience: Goat farmers, nutritionists, extension agents

Abstract

*The effect of supplementation of *Carica papaya* seeds (CPS) concentrate diet on the performance and faecal egg count of semi intensively village managed West African dwarf goats aged 6 to 8 months old with average weight of 7.31 ± 0.35 kg was evaluated in a 56 day feeding trial. Goats ($n = 16$) were balanced for weight and assigned into four groups in a completely randomized design to varying inclusion levels of *Carica papaya* seeds at 0, 5, 10 and 15g/100g concentrate. Results showed high concentrations of crude protein (25.63%) and ether extract (29.16%) with a tannin content of 0.72% in CPS. The intake of CPS concentrate differed ($P < 0.05$) across the treatment groups, with the least intake observed in goats fed 15% CPS. The supplementation of CPS across dietary treatments improved ($P < 0.05$) weight gain and reduced faecal egg counts in goats with best weight gain (35.71g/day) and percentage reduction in faecal egg count (77.27%) observed in goats supplemented with 10g CPS concentrate diet. Considering the easy access of *Carica papaya* seeds and its availability to local farmers who manage the majority of these goats, it was concluded that the supplementation of goats' diets with 10g CPS in 100g concentrate diet can play an important role not only in improving the growth rate but also reducing faecal egg count thereby serving as a natural low cost deworming herb.*

Keywords: *Carica papaya* seeds, goats, performance, faecal egg count.

Description of problem

Goats in Nigeria are ubiquitous in villages throughout the rainforest and the derived savannah zones (1). These goats have great economic potential due to high fertility, fecundity, prolificacy, early maturity and their adaptability to the humid environment (2), but the economic benefits obtained from these goats are far below expectation due to low productivity not only because of poor nutrition but also as a result of

worm's infestation.

Most goat owners rely mostly on the application of chemical anthelmintics for the control of parasitic infection, based on massive and strategic use of modern drugs as anthelmintic. Unfortunately, the high cost as well as the resistance of some strains to most active agents in these drugs, often in combination with poor management practices (3), has necessitated the use of alternative medicinal plants for the

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control of helminthes(4,5), which its efficacy against parasitic diseases have been reported with variable success (6).

Carica papaya, a fruit plant also called pawpaw, is readily available all year round with easy access for exploitation in tropical areas. Different parts of the plants have been used for the treatment of various ailments. *Carica papaya* seeds have been evaluated as an antibacterial and anthelmintic against gastro intestinal worms, (7, 8, 9). It has been reported to possess high content of protein and good source of minerals with the presence of high fat and some anti-nutritional factors such as phytic acid, tannins and oxalate (10), which if adequately harnessed can be beneficial to livestock. This study therefore evaluates the effects of *Carica papaya* seeds on growth and faecal egg count of semi intensively village managed goats.

Materials and Methods

Experimental animals and management

Sixteen (16) semi-intensively village managed West African Dwarf goats with

average age of 6-8 months was randomly selected from the flock of small holder goat farmers in Isolu village in Odeda Local government area of Ogun state, Nigeria. The experimental goats were divided in a completely randomized design into four groups of four goats per treatment and were allowed to graze between the hours of 0800 and 1400 daily, having access to some pasture after which they were supplemented with 150g of concentrate diet containing varying levels of *Carica papaya* seeds in an enclosed shed for a period of 8 weeks.

Preparation of the Carica papaya seeds

The seeds of *Carica papaya* were collected freshly from ripe pawpaw fruits around the experimental site. The fruit were sliced, seeds removed from pulp, sun-dried for two weeks and later ground into powdery forms before incorporating into the concentrate diets containing maize, palm kernel cake, rice bran, cassava peels, bone meal and salt supplemented with 0, 5, 10 and 15g *Carica papaya* seed/100 g concentrate (Table 1).

Table 1: Ingredient composition of *Carica papaya* seed concentrate diet supplemented to goats

Parameters	0gCPS	5gCPS	10gCPS	15gCPS
Maize	14.00	14.00	14.00	14.00
Wheat offal	20.00	20.00	20.00	20.00
<i>Carica papaya</i> seeds	0.00	5.00	10.00	15.00
Palm kernel cake	31.00	26.00	21.00	16.00
Rice bran	17.00	17.00	17.00	17.00
Dried cassava peels	15.00	15.00	15.00	15.00
Bone meal	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25
Vit/Mineral Premix	0.25	0.25	0.25	0.25

CPS: *Carica papaya* seeds

Data Collection

The intake of the *Carica papaya* seed concentrate by the experimental goats was determined by the difference in weight in the quantity of feed provided and the leftovers of the previous day's feed, while the weight changes were recorded on a weekly basis using a spring balance. Faecal samples from the animals were collected at the onset of the experiment and at 2 weeks intervals, directly from the rectum of the goats and then placed in labeled sterile universal bottles for identification of helminthic eggs using floatation techniques(1). The modified McMaster egg-counting technique was used for nematode counts. Tannin in feed was determined by the method of(11).

Statistical analysis

Data collected were subjected to analysis of variance in a completely randomized design (12). Means were compared using Duncan multiple range test(13).

Results and Discussion

The chemical composition of *Carica papaya* seed (CPS) concentrate fed to the experimental goats is shown in Table 2. The CPS showed high concentrations of protein (25.63%) and ether extract(29.16%) which corroborates the reports of (10, 14) that CPS contained high content of protein and good source of calcium, magnesium and phosphorus

with high presence of fat and some anti-nutritional factors such as phytic acid, tannins, trypsin inhibitors and oxalate. However, the protein and fat contents of CPS in this study were slightly lower to the values reported by (15, 16), which could be attributed to climatic conditions, growing season, cultivation site as well as the variety of *Carica papaya* used in this study.

The tannin content of 0.72% observed in CPS in this study were comparable to 0.77- 0.79% reported by (17, 18) but higher than 0.25 -0.29% reported by(16), variation might have been caused by differences in genetic origin, soil fertility and time of harvest as well as seed processing. Tannin contents have been found to be beneficial or detrimental to ruminants, depending on which and how much is consumed, the compound's structure and molecular weight, and on the physiology of the consuming species (19).

The concentrate diets with the inclusion of CPS showed similarities in dry matter (DM) values that ranged from 92.45 to 92.69%. The crude protein content was above the 10 to 12% crude protein moderate level required by ruminants for minimum growth performance (20), thus suggesting its tendency to provide fermentable carbohydrate and nitrogen to augment the supplement of nutrients in forages grazed by the animals and encourage rumen degradation (21).

Table 2 : Proximate composition (%) of *Carica papaya* seed concentrate supplemented to goats

Parameters	0gCPS	5gCPS	10gCPS	15gCPS	CPS
Dry matter	92.45	92.51	92.66	92.69	93.82
Crude protein	14.52	15.02	15.91	16.35	25.63
Ash	7.41	7.67	7.69	7.76	8.27
Crude fibre	5.04	5.99	6.52	7.01	30.51
Ether extract	5.26	5.36	5.48	5.91	29.16
Tannin	0.00	0.22	0.30	0.57	0.72

*CPS: *Carica papaya* seeds

The performance of goats supplemented with concentrate containing varying levels of *Carica papaya* seeds are shown in Table 3. Feed intake observed in this study differed ($P<0.05$) across the treatment groups with goats on 0, 5 and 10gCPS consuming the entire 150g concentrate supplement provided. The low ($P<0.05$) concentrate intake (125.7g/day) in goats fed 15% CPS compared to other CPS supplemented treatments suggested that CPS were probably less palatable and acceptable to goats at this level, this observation might be due to the tannin content of the feed. Some mechanisms such as a reduction in feed palatability, the slowing of digestion, and the development of conditioned aversions have been suggested to explain the negative effects of high tannin concentrations on voluntary feed intake of ruminants (22). The effect of high tannin in diet of ruminants has been found to vary, mainly dependent on the quantity consumed (23) observed no significant reduction in voluntary feed intake in sheep whose diet included

Terminalia oblongata, a species low in tannins, while a reduction did occur when the same animals were fed *Clidemia hirta*, a shrub with high tannin content. Nevertheless, high content of some other metabolites not analysed in this study such as phytic acid, trypsin inhibitors and oxalate which has been reported to be found in CPS (14) could also be added to the low concentrate intake by the goats.

The weight gain (g/day) of goats fed varying inclusion levels of CPS concentrate differed ($p<0.05$) across treatments, ranging from 25.89 to 35.71 in goats on 0g CPS and 10gCPS, respectively, the goats fed CPS contained diets have higher ($p<0.05$) values, suggesting the ability of the goats in this experiment to properly utilize the CPS supplemented concentrate diet for body weight gain. The range for weight gain (g/day) observed in this study were comparable to the values recorded for WAD goats fed varying supplemented concentrate diets (24, 25) but better than the reports of (26) in the same breed of goat.

Table 3: Performance and percentage reduction in faecal egg count of goats supplemented with concentrate containing varying levels of *Carica papaya* seeds.

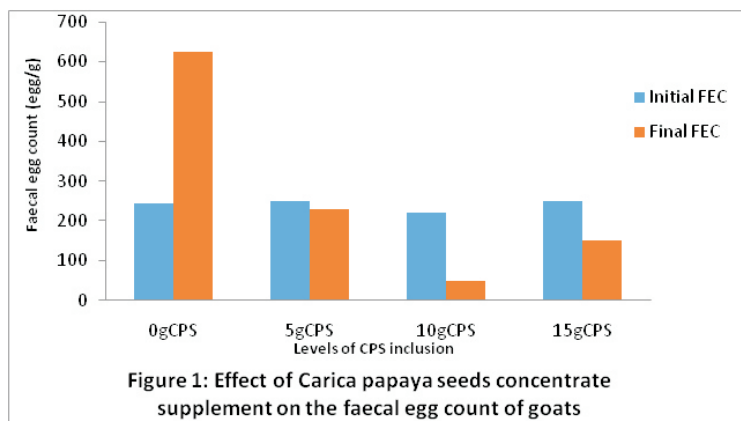
Parameters	0gCPS	5gCPS	10gCPS	15gCPS	SEM
Initial weight (kg)	7.00	7.70	7.25	7.30	0.66
Final weight (kg)	8.45	9.35	9.45	9.00	0.78
Weight gain (kg)	1.45 ^b	1.65 ^{ab}	2.00 ^a	1.70 ^{ab}	0.15
Average weight gain (g/day)	25.89 ^c	28.45 ^{bc}	35.71 ^a	30.35 ^b	1.25
Weight gain ($W^{0.75}$ /day)	11.48 ^b	12.31 ^b	14.61 ^a	12.93 ^b	0.99
Concentrate intake(g/day)	150.00 ^a	150.00 ^a	150.00 ^a	125.70 ^b	3.13
% Reduction in faecal egg count	-155.10	8.69	77.27	40.00	8.99

^{abc}Means in the same row with different superscripts differ significantly ($P<0.05$)
CPS: *Carica papaya* seeds

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The CPS dietary supplementation in this study caused a significant reduction in the worm burden of the goats (Figure 1). The final values for faecal egg count (egg/g) observed in animals fed concentrate with varying levels of CPS at the end of 8 weeks experimental

period were reduced compared to goats fed the control diet that showed an increase in the egg counts. Goats fed 10g CPS per 100g concentrate experienced more significant reduction (77.27%) in egg counts relative to the other treatments.



The reduction in egg counts observed in goats fed CPS concentrate supplement could be attributed to the presence of tannin in the seeds of *Carica papaya*. Higher concentrations of tannins in plant species have been found to help to control certain internal parasites of animals (27). However, a reduction in nematode population in goats administered *Carica papaya* seeds as a substitute for albendazole was observed by (28). (29) also reported that chemical drug application together with *Carica papaya* seeds in powder and aqueous form resulted to a notable decrease of worms in goats.

However, the results of this study that showed an improvement in weight gain with a reduction in faecal egg count further supports earlier findings of the relationship between weight gain and faecal egg count in ruminant animals (30, 31).

Conclusion and Application

It could be concluded from the results of this study that:

1. The inclusion of 10g *Carica papaya* seeds in 100g of concentrate diets was effective in increasing weight gain and reducing the faecal egg count in West African Dwarf goats.
2. The easy accessibility and availability of *Carica papaya* seeds in most communities in Nigeria can be exploited in goat production systems in improving weight gain and reducing worm burden, thereby serving as a natural low-cost deworming herb as well as avoiding the drug resistance observed in the treatment of helminthes in these goats.

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