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Effect of Feeding Graded Levels of Tigernut (*Cyperus esculentus*) Seed Meal on the Performance Characteristics of West African Dwarf Goat

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Abstract: The efficacy of Tigernut seed meal in the diet of West African Dwarf (WAD) goats was evaluated in a completely randomized design model for a 56 day period. The diets consist of A (control, without Tigernut seed meal), B (10% Tigernut seed meal plus 28% wheat offal) and C (20% Tigernut seed meal plus 18% wheat offal). Other ingredients are of fixed percentages. The results revealed increasing crude protein and acid detergent fibre contents as the Tigernut seed meal increased. The intakes of the two components (crude protein and acid detergent fibre) were significantly higher in diet C compared to other diets However, the crude protein digestibility was similar in all the diets while the acid detergent fibre digestibility of the Tigernut seed meal based diet was superior ($p<0.05$) to that of the control. The ether extract intake and digestibility were higher ($p<0.05$) for diets B and C (Tigernut seed meal based diets) compared to diet A (control). The crude fibre digestibility of diet C was numerically higher than that of diet A (control) which are similar ($p>0.05$). Animals on Tigernut seed meal based diet gained more weight than those on diet A (control) due probably to higher feed efficiency of these diets (B and C). In conclusion, a Tigernut seed meal could form part of the complete diet, supplying both protein and energy supplements in the diet of ruminant animals.

Key words: West African dwarf goat, Tigernut seed meal, feed intake, digestibility, weight gain

Introduction

Livestock farmers in developing countries are faced with various problems mostly during the dry season of the year. These problems include feed shortage, high prices of feed ingredients and climatic variations. The effects of these challenges have reflection on the quality and quantity of animal protein available for human consumption. To overcome these problems, attention must be paid on the utilization of lesser known unconventional feedstuff like Tigernut (*Cyperus esculentus*).

Tigernut was reported as noxious, invasive and injurious weed in the tropic and temperate zones (Tigernut and Health, 2005). Tigernuts are edible tubers with a slightly sweet, nutty flavour. The nuts have excellent nutritional qualities with a fat composition similar to olive oil. The nuts are also very rich in mineral content especially phosphorus and potassium (Eteshola and Oraedu, 1996). The nuts are gluten and cholesterol free with low sodium content (Martinez, 2003) and it is regarded as digestive tonic due to the heating and dry effect on the digestive system thereby alleviating flatulence.

The nuts promote urine production and they are said to be aphrodistic, carminative, diuretic, emmenagogue, stimulant and tonic. In ayurvedic medicine, the nut can be used to treat indigestion, colic, diarrhea, dysentery, debility and excessive thirst.

Bamigbose *et al.* (2003) reported better carcass yield and low cost of feed consumed when 33.3% of tigernut was used to replace maize in the diet of cockerel. The nutritive quality of the nut, its present position as weed as well as paucity of information on its inclusion in ruminant diet, stimulated this study. The thrust of the study was to evaluate the efficacy of dietary tigernut seed meal on the performance characteristics of West African Dwarf (WAD) goat.

Materials and Methods

Animals and management: West African dwarf goats (n = 24) used for the experiment were housed intensively. The animals were treated against ecto and endo-parasites using ivomec (0.5 mL) while L-oxytetracycline injection was given against cold and pneumonia. Feeding and watering were done ad libitum while the experiment lasted for a 56 day period with a 14 day adjustment and preliminary period.

The animals were weighed at the start and end of the experimental period to determine the weight gain. The digestibility coefficient was determined during the last two weeks of the experimental period.

Dietary treatment: Tigernut seed meal was used to replace wheat offal at 10 and 20% (w/w) in diets B and C while diet A (control) had no Tigernut seed meal inclusion. Other ingredients are of fixed proportion (Table 1).

Table 1: Composition of the experimental diets

	Diets		
Ingredients %	A	B	C
Cassava waste	50.50	50.50	50.50
Soybean meal	10.00	10.00	10.00
Tigernut seed meal	----	10.00	20.00
Wheat offal	38.00	28.00	18.00
Vitamin-mineral premix	0.50	0.50	0.50
Salt	1.00	1.00	1.00
Total	100.00	100.00	100.00
Proximate Composition (%)			
Dry matter	93.80	92.00	89.60
Crude protein	11.90	15.94	17.80
Crude fibre	18.23	21.25	21.32
Ether extract	35.39	34.84	30.89
Acid Detergent fibre	22.71	20.22	37.05

Table 2: Nutrient intake, digestibility and weight gain of the experimental animals

	Diets			
Parameters	A	B	C	SEM
Dry matter Intake (g)	1364.50^{a}	1124.09^{b}	1167.17^{b}	10.08*
Dry matter Digestibility (%)	89.19	87.25	88.67	3.15^{NS}
Crude Protein Intake (g)	162.38^{b}	177.18^{b}	207.99^{a}	10.04*
Crude Protein Digestibility (%)	76.46	76.48	80.96	5.36^{NS}
Crude Fibre Intake (g)	248.75	238.87	248.84	15.02^{NS}
Crude Fibre Digestibility (%)	78.46^{b}	69.86^{a}	82.22^{b}	5.75*
Ether extract Intake (g)	592.06^{a}	391.63^{b}	593.97^{a}	16.04*
Ether extract Digestibility (%)	78.03^{b}	63.55^{a}	79.00^{b}	5.32*
ADF Intake (g)	309.88^{b}	227.29^{c}	538.47^{a}	13.03*
ADF Digestibility (%)	93.70^{b}	98.27^{b}	98.45^{a}	6.31*
Weight gain (g/d)	250.10^{b}	3180.00^{a}	3250.13^{a}	11.12*
Feed efficiency	0.18^{a}	2.83^{b}	2.78^{c}	0.05

Means along the row with similar superscripts are not significantly different from each other (p>0.05)

Parameters determined: Parameters determined include feed intake, weight gain and the digestibility coefficient.

Analyses: The proximate composition was determined by the method of A.O.A.C. (1990) while the data collected was subjected to analysis of variance of a completely randomized design model and the treatment means separated by Duncan (1955) multiple range test.

Results and Discussion

Table 1 shows the composition of the experimental diets as well as the proximate composition of these diets. The results revealed increasing crude protein content as the inclusion levels of the Tigernut seed meal increased in the diets. Diet C had the highest crude protein content followed by diet B and the least was diet A (control). This confirms the report of Bamigbose *et al.* (2003). The crude fibre and Acid Detergent Fibre (ADF) were higher for the Tigernut seed meal based diets (B and C) compared to diet A (control).

Table 2 shows the feed intake and the digestibility coefficients of the diets. The higher ADF and crude protein intake of diets B and C could be due probably to the highest level of protein in Tigernut seed meal based diets compared to diet A (control).

However, the crude protein digestibility was similar among the diets. This shows that the Tigernut seed meal could be used to replace wheat offal which was found to be scarce and expensive in Africa.

The ether extract intake of diet C was similar to diet A (control) but different ($p<0.05$) from diet B. Similar trend was observed for ether extract digestibility. The similarities in the ether extract intake and digestibility of diet C compared to diet A could be due to the presence of non-drying oil in the rhizome of Tigernut (Tigernut and Health, 2005).

Despite, higher crude fibre content of the Tigernut seed meal based diet; the animals were able to consumed similar quantities of these diets (B and C) as diet A (control). However, the highest crude fibre digestibility was reported for diet C. The higher fibre content of Tigernut seed meal based diet will make the diet ideal for eating (Tigernut and Health, 2005).

The increased weight gain of animals on the Tigernut seed meal based diet could be due to the superior ($p<0.05$) feed efficiency of these diets (B and C). Animals on diets B and C had better weight gain compared to that of diet A (control).

Conclusion: The best feed efficiency and weight gain reported for animals on Tigernut seed meal based diets in this study could be due probably to the excellent nutritional quality of the nut. Hence, Tigernut which is known as troublesome weed in some part of the globe should form part of the complete diet supplying both protein and energy in the diet of ruminant animals.

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