

## IN SITU NUTRIENTS DISAPPEARANCE OF SWEET POTATO VINE CULTIVARS BY GOATS

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### ABSTRACT

The objective of the study was to determine the effect of sweet potato vine cultivars on *in sacco* nutrients disappearance. Three bucks were cannulated and assigned to switch over design. Samples were incubated for 0, 8, 12, 18, 24, 32 and 48 hours. The result revealed that sweet potato vine cultivars have no significant effect ( $P>0.05$ ) on dry matter disappearance (76.74 vs 80.41%) for *Danchina* and *King J* respectively. However, the dry matter disappearance of Cowpea (66.05%) was lower. Acid detergent fibre and neutral detergent fibre follows similar pattern with dry matter disappearance. Sweet potato vine cultivars have significant ( $P<0.05$ ) effect on Crude Protein (CP) disappearance for *Danchina* and *King J* (80.08 and 90.14%) respectively. It was concluded that *King J* and *Danchina* sweet potato vine cultivars can be fed to animals as a replacement of Cowpea hay as they were proven to be nutritionally good in term of disappearance.

**Keywords:** disappearance; bucks; cannulated; and vines

### INTRODUCTION

Among the livestock that makes up the farm animals in Nigeria, ruminants comprising sheep, goats and cattle, constitute the farm animals largely reared by families in the country's agricultural system. The larger proportion of these animals' are concentrated in the Northern region of the country than the Southern region (Adebowale, 2012). The most difficult problem in ruminant production in the tropics is the scarcity of energy and protein feedstuffs during the dry season (Odeyinka *et al*, 2009). This led to the search for cheap sources of energy and protein feed stuffs to supplement the low quality forages of the dry season (Nworgu, 2006). One of the alternative feed resources during the seasonal nutritional stress is the use of sweet potato vines which has been limited far and it principally consists of vines being fed to livestock as energy and protein supplements. The vines make good feed for ruminant without restriction, which can be fed for milking and fattening animals, and no need to give any supplement as the vines alone can supply all the protein needed by these animals. It also contains nutrients that would sustain acceptable growth in heifers (Sankaran *et al.*, 2012). The aim of the study was to determine the effect of *in situ* nutrients disappearance by goat bucks fed sweet potato vines.

### MATERIALS AND METHODS

**Experimental location:** The study was conducted at livestock and research farm, faculty of Agriculture Bayero University Kano.

**Experimental design:** Switch over experimental design was used in the study where two varieties of sweet potato vines (*Danchina* and *King J*) and Cowpea hay (Control diets) were fed to the bucks in three different cycles.

**Experimental animals and their management:** Three bucks with an average initial body weight of 19.43kg were used for the study. The experimental animals were cannulated and allowed to recover for about two weeks. They were offered *Danchina* vine (Local variety), *King J* vine (Improved variety) and Cowpea hay (Control diet) as basal feed in the morning hours while the concentrates were also formulated and offered to the animals as a supplements in the evening hours. The ratio of forage to concentrate offered were 60:40.

*In situ* procedure was carried out in accordance with Orskov *et al.* (1980). Dried samples of the vines were milled to pass through a 2 mm sieve. Four (4) grams of the vine samples were transferred into the bags and incubated in the rumen of each breed of buck with a permanent cannula in triplicate for 8, 12, 18, 24, 32 and 48 hours.

Dry matter disappearance was estimated as described by Osuji *et al.*, 1993:

$$\text{DMD} = \frac{(\text{SWa} - \text{BW}) \times \text{DMa} - (\text{SWb} - \text{BW}) \times \text{DMb}}{(\text{SWa} - \text{BW}) \times \text{DMa}}$$

Where: SWa= weight of original sample + nylon bag

BW = weight of empty nylon bag

SWb=weight of the sample + nylon bag after incubation

DMa = dry matter of feed sample

DMb = dry matter of residue sample

The measure of fraction of the DM, CP, ADF and NDF was expressed as the differences between the amount of the original samples and the remaining in the nylon bags after the incubation. Nutrients disappearance was calculated as the difference between the fractions of nutrients lost during the washing and the truly water soluble fraction (Woods *et al.* 2002).

**Chemical analysis:** The feed samples which include both the concentrate and the forage were analyzed for proximate composition in accordance with AOAC (2005). The ADF and NDF were analyzed according to Van Soest *et al.*, (1991).

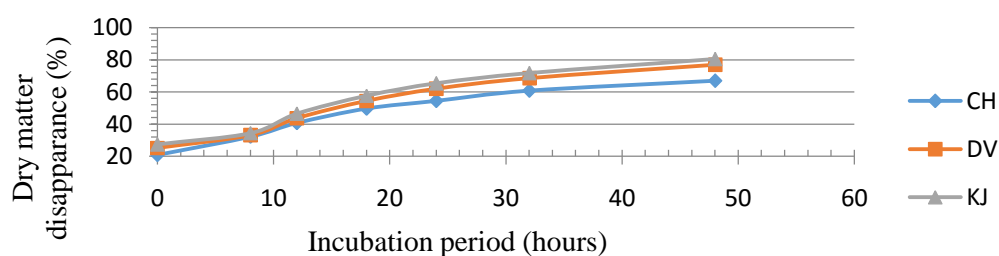
Table 1: Composition of the experimental diets (%)

Item	T1	T2	T3	Cowpea hay	Danchina	King J
Maize	03	24	09			
Wheat offal	30	14	22			
Cowpea husk	20	07	15			
Groundnut Cake	07	28	21			
Rice bran	12	10	10			
Rice Milling Waste	26	15	21			
Salt	02	02	02			
			Chemical Composition			
DM	91.24	90.97	90.00	86.98	92.12	91.26
CP	16.01	16.05	16.08	13.01	13.74	14.71
CF	22.47	21.17	20.73	20.40	19.08	18.00
EE	4.15	4.75	4.60	4.38	4.26	3.95
ASH	12.93	13.55	12.38	8.33	7.46	9.23
NFE	41.86	42.47	45.33	40.86	47.58	45.37
ADF	29.28	29.13	29.10	25.95	27.53	27.16
NDF	36.85	35.59	32.10	33.06	35.09	35.27

DM: Dry matter, CP: Crude protein, CF: Crude fiber, EE: Ether extract, NFE: Nitrogen Free Extract, ADF: Acid detergent fibre, NDF: Neutral detergent fiber, T1: Concentrate diets to the goats fed cowpea hay, T2: Concentrate diets to the goats fed danchina vine, T3: Concentrate diets to the goats fed king j vine

## RESULTS AND DISCUSSION

Nutrients disappearance of sweet potato vines revealed the possible degradation of nutrients incubated *in sacco* after certain period of time. Sweet potato vines cultivars have no effect ( $p>0.05$ ) on DM disappearance (76.74 vs 80.41 %) for *Danchina* and *King J* respectively. However, *in sacco* DM disappearance of cowpea (66.05%) was lower ( $p<0.05$ ) when compared with the two potato cultivars. The disappearance of *in sacco* CP did not follow the same pattern with the *in sacco* rumen DM disappearance (Figure 1a). There was significant effect ( $p<0.05$ ) between *in sacco* rumen CP disappearance for sweet potato vines (80.08 and 90.14%) for *Danchina* and *King J* respectively) and Cowpea hay (72.10%). Sweet potato vines had increased ( $p<0.05$ ) CP *in sacco* rumen disappearance than Cowpea hay. Figure 1c revealed the disappearance pattern of acid detergent fiber (ADF). Sweet potato vine cultivars have no effect ( $p>0.05$ ) on *in sacco* rumen ADF disappearance. Moreover, there is no significant difference ( $p>0.05$ ) on *in sacco* rumen ADF disappearance between the cowpea hay and the two sweet potato vine cultivars (68.50, 65.39 and 64.38 for cowpea, *Danchina* and *King J* respectively). The disappearance of *In sacco* rumen NDF disappearance follows similar pattern with *In sacco* ADF disappearance (Figure 1d) Based on the findings, sweet potato vine cultivars had more than 50% dry matter disappearance at 48 hours of incubation. This indicated that all the cultivars could be used as feed for livestock due to the forage quality that meet the requirements for feeding livestock as observed by Larbi *et al.*, (2007). The *in sacco* nutrients disappearance indicated that the disappearance features of *Cowpea*, *Danchina* and *King J* vines differed slightly among themselves. This is similar to the report of Chumpawadee *et al.*, (2005). Results of dry matter disappearance observed values are in accordance with the values reported by Chumpawadee *et al.* (2005) but higher than those reported by Fadel *et al.*, (2007). The CP disappearance values obtained were comparable to those obtained by Chumpawadee *et al.* (2005). Greater CP disappearance was reported by Bayourthe *et al.*, (2000) for Pea (*Pisum sativum*) flour. Lower CP disappearance value was obtained by Danesh *et al.*, (2005). The result for the CP disappearance of sweet potato vines in this study showed that nutrient disappearance was comparatively higher. The CP nutrients of *King J* and *Danchina* vines disappeared faster in the rumen than that of the Cowpea. This could be due to greater proteolytic activities of the ruminal microflora there by evoking a higher disappearance Antwi *et al.*, (2014). The Acid detergent fibre and neutral detergent fibre disappearance obtained in this study were comparable to the values reported by Pawelek *et al.*, (2008). The disappearance parameters measured in this study are of paramount importance as they influence rumen fill and hence feed intake (Van Soest, 1987).



b

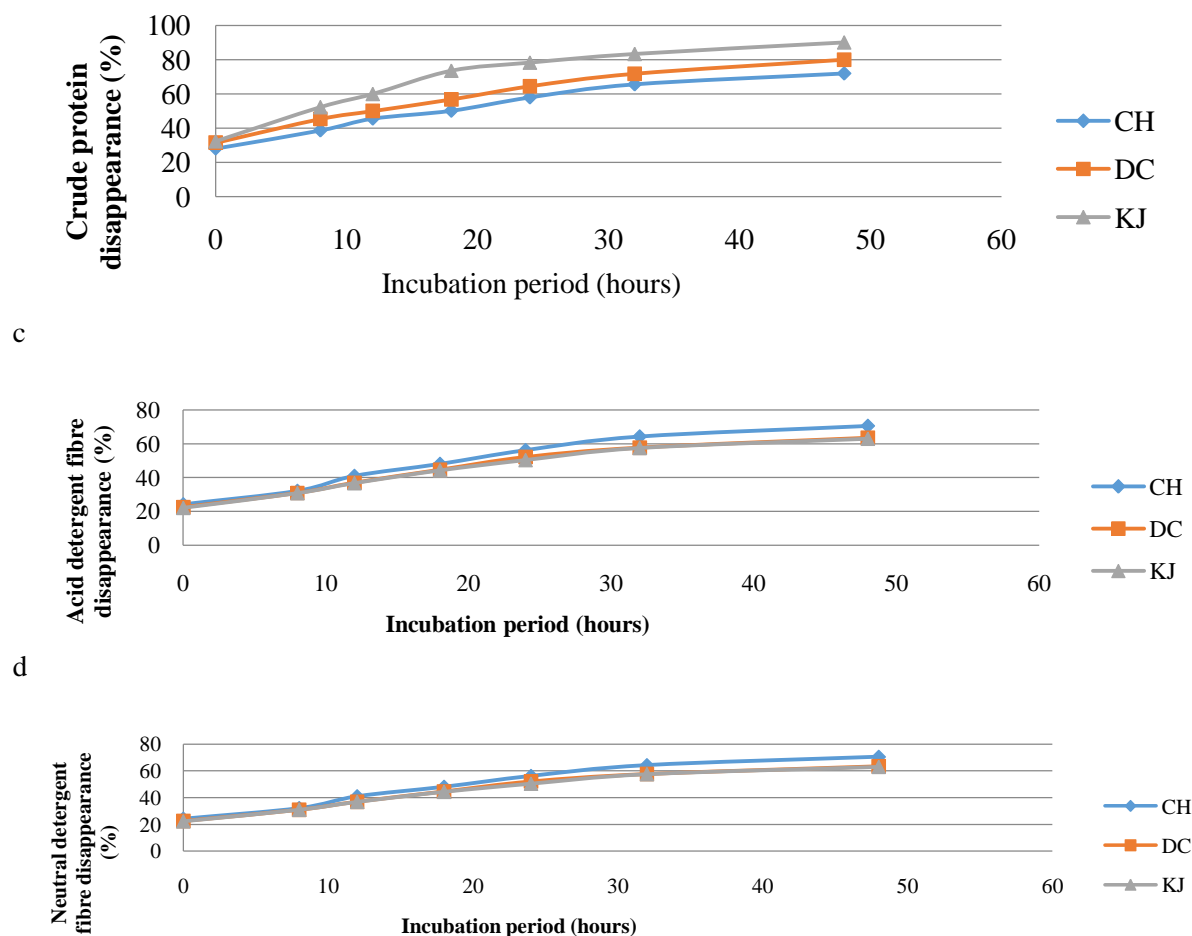


Figure 1: Pattern of disappearance of a) dry matter b) crude protein c) acid detergent fibre d) neutral detergent fibre from CH: cowpea hay, DC: danchina sweet potato vine cultivar, KJ: king j sweet potato vine cultivar during rumen incubation for various times in goat.

## CONCLUSION AND RECOMMENDATION

It was concluded that *King J* and *Danchina* sweet potato vine cultivars can be fed to animals as a replacement of Cowpea hay as they were proven to be nutritionally good in term of disappearance. More research should be conducted further with a view to ascertaining the nutritive value of sweet potato vines.

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