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SELECTED INDIGENOUS WILD FRUITS INFLUENCE ON FEEDING BEHAVIOUR OF CAPTIVE OLIVE BABOONS (*Papio anubis.* Lesson, 1827)

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Abstract
Feeding behaviour of captive male olive baboons was studied in a 200 feeding trial using five selected indigenous fruits: Strychnos spinosa (SS), Nuclear latifolia (NL), Piliostigma thonningii (PT), Detarium macrocarpum (DM) and Adansonia digitata (AD), categorized into large, medium and small sizes with a view to foster this animal ex-situ conservation. The fruits were harvested fresh and served on the floor of the cages in-between morning and afternoon routine feeding. Data were collected on fruit choice to determine fruits preference; time spent to remove or break the fruits pericarp; and the position of the animal while eating. This study shows that fruits preference was significantly ($p < 0.05$) influenced. It followed the order: DM>NL>PT>SS>AD. Experimental Olive baboons picked small fruits ahead of others irrespective of their nutritional quality. Time spent to remove or break the fruits pericarp were significantly ($p < 0.05$) influenced. On eighty-nine occasions, captive Olive baboons preferred hanging on the cages walls while eaten. For sustainable conservation of this fauna species, more research on its feeding behaviour with respect to these fruits shape, weight and colour is encouraged.

Key Words: *Olive baboons, Conservation, Feeding behaviour, Wild fruits*

Introducion

Effective management of animals inside Zoological gardens and similar environment requires considerable knowledge of the interaction between them and their environment. One of the animal that is of global interests most especially in the area of medicine to test drug efficacy before human consumption is baboons (Williams-Blangero *et al*., 1990). It is important to understand the behaviour of primates in zoos/controlled environments as a means of ensuring better welfare, and to document information for zoo visitors. For many consumptive and non-consumptive benefits of primate to be achievable, conservation efforts needs to be more directed towards its *ex-situ* management. In *in-situ* and *ex-situ* conservation, food availability, quality and composition are inevitable. According to Chapman *et al*. (2003) feeding behaviour is a valuable tool in primate conservation. Tovar *et al.* (2005) submitted that food composition and the strategy of provisioning influence the physical and psychological fitness of an individual

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animal for captive breeding programmes. Jordano (2000) reported that fruit is a regular part of the diet of almost all diurnal primate species and frugivorous primates commonly consume fruits and seeds of different plant species (Poulsen *et al.,* 2001). Fruit and the preference for a fruit-based diet is usually related to the high content of easily digestible macronutrients, such as nonstructural carbohydrates and lipids, and to low levels of indigestible fibers and antifeedants (Milton, 1987). Herrera (1992) made known that phylogenetic may determine fruit traits at least to some degree while the contribution of Jordano (1993) revealed that frugivores may exert selection pressures on fruit characteristics (Jordano 1993). Essential to an understanding of the ecology of any organism is knowledge of nutritional aspects of their diet, as adequate nutrition is critical for successful reproduction (Barboza *et al*., 2009). In this study, the selected indigenous fruits growing within guinea savannah, Nigeria were categorized into sizes, chemical analysis of fruits was carried out before observation and documentation of fruits preference study, time spent to remove or break the fruit's pericarp and the eating position of captive adult male Olive baboons.

Objectives

The broad objective of this study was to investigate response of captive male Olive baboons served selected indigenous wild fruits

Specific objectives

To categorized the selected wild fruits into sizes

To determine the chemical composition of the selected wild fruits

To evaluate fruits preference of captive male Olive baboons

To calculate time spent by captive male Olive baboons to remove fruits pericarp

To observe position of the experimental animals during eating

Methodology

This study was conducted at the mini-zoo of Federal College of Wildlife Management, New Bussa, Niger State, Nigeria. The college is located on latitude 7° 08′and 1° 00′N and longitude 4° 30′ and 4° 33′E in-between Kainji dam and New Bussa, Niger State (Ogunjinmi *et al*., 2007). Preliminary observations of fruits regularly patronize or shadow by wild Olive baboons within the college estate was conducted. Experimental animals comprised of four differently caged adult male Olive baboons while the five experimental fruits items are *Detarium macrocarpum, Nuclear latifolia, Adansonia digitata, Piliostigma thonnigii, and Strychnos spinosa.* These fruits were collected fresh on daily bases within the College estate. We measured fruits length with a sliding calliper (accuracy 0.01 mm), but used ruler for large and elongated fruit. The fruits were classified into small, medium and large following the procedure of Lambert and Garber (1998) while the chemical composition was conducted accordingly (AOAC, 1990). These experimental fruits were then served in a 200 feeding trial on the floor of the cages from 12hrs to about 14hr, after the usual morning feeding and before the evening feeding. In order to counterbalance possible food position preferences by the experimental animals, the served fruits were pseudo-randomized. Fruit choice was monitored through visual observation of the first chosen fruit. Fruit preference was determined through modification in the formula outlined by Tomlinson (1980). Percentages obtained were ranked

according to their order of magnitude from highest to lowest, thus providing a preference ranking. A stopwatch was used to record the time spent by these animals to remove or break the pericarp of fruits picked. The data generated were analyzed using descriptive statistics, student t-test and one-way analysis of variance. Significant differences between the means were determined using the LSD test.

Results and Discussion

The description and chemical composition of the experimental fruits are presented in Tables 1 and 2. It was revealed that the chemical composition of the fruits items are within the range informed by to support growth, reproduction and regulation of body functions in baboons (Richard, 1998; Akosin *et al.*, 2010; Akinyemi and Kayode, 2013).

Table 1: Description of experimental fruits

Fruits	Mean Length (cm)	Mean Diameter (cm)	Size
Detarium macrocarpum	3.70±0.30	3.18±0.47	Small
Nuclear latifolia	6.30±0.12	4.70±0.20	Small
Adansonia digitata	12.10±0.10	10.20±0.70	Big
Piliostigma thonningii	10.70±0.69	5.42±0.25	Medium
Strychnos spinosa	7.60±0.20	7.68±0.20	Big

Table 2: Chemical composition of the experimental fruits

Items	Proximate (%)					Elements (mg/100g)				
	DM	CP	CF	Ash	EE	K	Mg	Ca	Fe	Zn
D. macrocarpum	89.20	7.58	10.20	4.12	4.50	99.20	75.85	70.40	30.20	5.30
N. latifolia	32.10	10.20	14.48	5.34	4.90	105.19	70.10	76.00	30.05	5.20
A. digitata	90.00	18.80	16.10	5.70	3.20	241.10	21.10	17.00	6.00	1.75
P. thonningii	70.15	9.80	30.60	6.40	3.10	35.73	14.10	86.04	3.70	0.20
S. spinosa	72.25.	5.45	2.60	17.20	10.45	37.60	11.00	70.20	3.10	0.90

The result of fruits preference of captive Olive baboons in this study is presented in Table 3. Fruits preference followed the order *Detarium macrocarpum* > *Nuclear latifolia,* > *Piliostigma thonningii,* > *Strychnos spinosa* > *Adansonia digitata.* This preference may be as a result of the variation in fruit traits which include morphological fruit characteristics (e.g fruit colour, and the size), chemical and nutrient content of fruit and seeds reported (Russo, 2003). The order of preference in this study however differs from what was reported on wild Olive baboon (Akosin *et al*., 2010). Statistically, the differences observed in fruits preference of these indigenous five fruits served to the captive Olive baboons differs ($p< 0.05$) significantly (Table 4). This is probably due to hedonic pleasantness of the food's taste, smell, appearance, and texture reported (Rolls *et al*., 1981). The variation may also be connected with the study environment and food availability reported by Wansink (2004). Selected wild fruits preference ranking revealed that small sized fruits were most preferred. This partially agreed with the observation of Lambert and Garber (1988) where they reported that vast majority of fruit species in baboon diet was medium or large-sized. This study confirms earlier report by Silk, (1987) that other factors contribute to fruit choice. Fruit colour was also informed to enhance

conspicuousness of fruits and detection by frugivores and advertise far-ranging information on fruit maturity (Schaefer *et al.* 2004).

Table 3: Fruit preference by captive Olive Baboons

Served fruits	Frequency	Percentage	Preference Ranking
Strychnos spinosa	38	19.00	4th
Nuclear latifolia	41	20.50	2nd
Piliostigma thonningii	40	20.00	3rd
Detarium macrocarpum	61	30.50	1st
Adansonia digitata	20	10.00	5th
Total	200	100	

Table 4: Effects of fruit types on Fruit preference by captive Olive Baboons

Sources of Variation		SS	df	MS	F	Sig
Fruits choice	Between Groups	16.614	4	4.154	3.470	0.009
	Within Groups	233.386	195	1.197		
	Total	250.000	199			

Significant difference ($p < 0.05$) exist in the fruits preference of these captive Olive baboons

The finding on time spent by the experimental animal to remove or break the pericarp of the served fruits is presented in Table 5. The highest time spent to remove the pericarp of higher proportion of *Nuclear latifolia* and *Detarium macrocarpum* chosen by the experimental olive baboon was between 30 – 49 seconds. Majority of the pericarp of *Piliostigma thonningii* had the least time spent for their removal (10 – 29 seconds) while the pericarp of majority of *Adansonia digitata* and *Strychnos spinosa* fruits were removed between 50 – 69 seconds. Our findings on time spent by the animal to remove or break the pericarp differs ($p < 0.05$) significantly (Table 6). The trend in this finding may be connected with different pericarp texture of the experimental fruits. Lesser time spent to remove or broken the pericarp of *Piliostigma thonningii* fruits may be as a result of its size, texture and the ability of the experimental olive baboon to quickly handle this fruit.

Table 5: Time spent by captive Olive baboons to remove fruits pericarp

Time spent (Seconds) / Fruits items	10 - 29	30 - 49	50 - 69	70 above	Total
Strychnos spinosa	07	14	17	-	38
Nuclear latifolia	01	24	15	01	41
Piliostigma thonningii	19	11	09	01	40
Detarium macrocarpum	10	30	20	01	61
Adansonia digitata	04	05	11	-	20
Total	41	84	72	03	200

Table 6: Analysis of Variance on fruits types against time spent

Sources of Variation		SS	df	MS	F	Sig
Time spent	Between Groups	64.240	3	21.413	27.594	0.000
	Within Groups	185.760	196	0.948		
	Total	250.000	199			

There exists significant difference ($p < 0.05$) in the time spent to remove fruits pericarp

The result of the finding on observation on eating position of the experimental Olive baboons is presented in Table 7. It was revealed that 89(44.5%) hanging on cages wall followed by those sitting 72(36%), standing 21(10.5%) while the least 18(9%) was observed when the animals were moving. Different eating position is probably due to the temperament of the experimental animal and the presence of the researchers and visitors reported by Coussi-Korbel and Fragaszy (1995). From this study, it is observed that fruits types, fruits sizes and fruit pericarp texture go some way to explaining feeding behaviour in captive Olive baboons. We suggest further study on the aspects of fruits colour, shape, size and pericarp texture on captive Olive baboon feeding behaviour.

Table 7: Eating position of the experimental Olive baboons

Eating position	Frequency	Percentage
Hanging of the cages wall	89	44.5
Sitting	72	36.0
Standing	21	10.5
Moving	18	9.0
Total	200	100

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