FOOD AND FEEDING HABIT OF KOB (*Kobus kob kob*, Erxleben 1777) IN KAINJI LAKE NATIONAL PARK

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ABSTRACT

The availability of food resources affects the movement and dispersal of herbivores in a given area. Animals suffer from malnutrition due to a lack of nutrient-dense food that they are unable to find. This investigation focused on identifying the plant species and parts being used for food by Kob in Kainji Lake National Park. Direct method of observation was used for the study. A random selection of five pre-existing tracks-woodlands namely;— (A) Hussaini Masha track-, a Mixed *Deterium* woodland (B), Gilbert Child track, a *Terminalia* Riparian woodland, (C) Shehu Shagari track, a Reparian *Acacia* woodland (D), Mamudu Lapai track, a Mixed *Afzelia* woodland and (E) Awal Ibrahim track, an *Isoberlinia/ Afzelia* woodland were chosen for the study in the area. Feed plants and parts grazed by *kob* were identified through direct observations. The process involved observations of all group members before focusing on one individual seen to be most stable and easily identified. The data obtained were analyzed using Descriptive Statistics-tables, charts and percentages. The results revealed that nineteen plant species were identified as feed components for kob population in the Park in both wet and dry seasons. Wet season forage utilization includes *Andropogon gayanus* (23.43%), *Andropogon tectorum* (10.8%), *Gardenia aqualla and Grewia mollis* (0.91%) utilization respectively. Dry season forage utilization includes *Grewia mollis* (0.91%) and *Afzelia africana* (14.40%). Young leaf material was the most preferred part of plant species (50.88%), followed by fruits/ soft seed coat material (19.88%), while bark of tree was the least preferred part of plant (1.17%) utilized. It is concluded that the feeding habits of kobs change with the seasons, resulting in different patterns of habitat use and movement within a given area.

Keywords: food plants, season, kob, utilized, KLNP.

Introduction

Wildlife foods are generally described by their availability and palatability (Janean and David 2014). Availability refers to the season the food is present in the habitat, how much food there is, and how easily animals can access food. Palatability describes the nutritive and digestible qualities of food. Wildlife selects and eats palatable foods more often than other foods. Different levels of wildlife food preferences are recognized: First. preferred foods have high nutritional value and are eaten more frequently; Second, moderate value foods, or staples, provide adequate nutrition, but are usually the animal's second choice; and third stuffing or emergency foods provide low nutritional value. Wildlife eats these foods in large

amounts only when nothing else is available (Janean and David, 2014).

Assessing food quality is an important issue when managing and studying herbivores, such as kob. The quality of vegetation relates to the fertility of the soil (Bothma 1996). The higher the soil fertility, the better the nutritional quality, or palatability of the vegetation. Many young plant shoots are extremely palatable early in the growing season (Bothma 1996). The quantity of available food often is the strongest limiting factor in food resources (Waterman and Kool, 1994).

Herbivores rely entirely on plant materials to meet their nutrient and energy requirements (Waterman and Kool, 1994). They face special challenge in selecting optimal diet (Van-Soest 1992). Plants and parts are not simply discrete packets of nutrients, they also contain a range of metabolites that are variously refractory to digestion and capable of lowering the efficiency with which nutrients can be obtained or actually harmful to the animal through interference with normal physiological processes (Van Soest 1992).

Kobs are grazers of the commonest grasses, notably *Hyparrhenia, Brachiaria, Setaria* and *Paspalum* species, among many others. Seasonal change in diet emphasizes the kobs preference for a short sward (Kingdon, 1997). Most of daily activity of kob is spent feeding and ruminating with other activities in between; feeding is the dominant activity in early hours and late evening in the day (Agbelusi, 1991).

The rate of food intake by herbivores depends on the nutritive quality of the food for example in domestic sheep, intake rate first increases and the decreases as the energy quality of food declines (Fryxell *et al*., 2014).

Grass growth rates in the rainy season are more than sufficient for the animals, but in the dry season available food fell below maintenance requirements.

Food is continuously distributed across the landscape, rather than in definable patches. Animals graze according to marginal value rule, which implies concentrating its feeding in sites where food was higher than average (Distel *et al..* 1995). This lead to the animal having greater opportunity to develop detailed knowledge of the landscape as seen in the cattle (Distel *et al.,* 1995).

According to Fryxell et al. (2014), animals that are malnourished die because they are unable to obtain food that satisfies their nutritional needs. According to Bothma (1996) the nutritional value of plant species is determined by the degree to which the animal eats the plant material voluntarily and the efficiency with which the nutrient can be used for maintenance and plant production. The most valuable plant species are those which are regularly eaten and have a high nutritional value usually at the early growing stages. In the course of the growing season the quantity of food increases while the quality decreases (Bothma 1996). Protein is the most important component of food plants for animals (Bothma 1996). It is maintained that only 5% of crude protein in the vegetation is needed for African ungulates and 8% for growing livestock.

The purpose of this study is to determine the nutritional ecology of *kob* in Kainji Lake National Park by identifying food plant species and *kobs* feeding habits. The availability of food supplies for kob in the park would contribute to determining the animal's sustainability in its natural habitat. Understanding the condition of an animal

species' food supply in its natural habitat helps with managing the animals in a way that keeps the population of that species stable.

Materials and Methods

The Study Area

Kainji Lake National Park is located between latitudes 09°40'N - 10°30'N and longitudes 03° 30'E - 5° 50'E. The park covers a total area of 5340.82sq.km. The Kanji Lake National park was established in 1979 (under decrees 46 of 29th July, 1979), thereby making Kanji lake National park one of the most important National park in Africa, as is highly endowed with many flora and fauna resources. It is made up of two non-contiguous sectors, the Borgu and Zugurma sectors with Borgu sector comprising 3,970.83 km^2 (74.3%) and the Zugurma sector covering an area of 1,370 km^2 (25.7%). The vegetation of the Borgu sector has been described as Northern Savanna. The six main vegetation communities in Park are (i) *Burkea africana/Detarium microcarpum woodland savanna (ii) Diospyros mespiliformis* dry forest (iii) Riparian forest and woodland (iv) *Terminalia macroptera* tree savanna (v) *Isoberlinia tomentosa* woodland and *(vi) Isoberlinia doka*, savanna woodland (Ayeni, 2007).

The Oli River flows from the Republic of Benin through Borgu sector into the Niger River. In the dry season, the river breaks into pools that hold water throughout the year and serve as the only source of water for the wild animals. Long term average annual rainfall is between 900 and 1,100 mm. The Park is blessed with diverse fauna resources including *Papio anubis, Kobus kob, Hippopotamus amphibus, Syncerus caffer, Panthera leo, Panthera pardus, Hippotragus equinus and Alcelaphus buselaphus* amongst

others. Woody resources in the Park include *Burkea africana, Terminalia avicennoides, Diospyros mespiliformis, Anogeissus leiocarpus, Entanda africana and Vitex doniana* amongst others. Forage species in the Park include *Hyparrhenia dissoluta, Andropogon gayanus, Braciliaria brachyiopha, Hyparrhenia rufa, Adropogon perligulatus, Andropogon tectorium and Beckeropsis uniseta* amongst others (Ayeni *et al.,* 1982).

Sampling Techniques

Based on the methodology adopted from Akanbi (1997), which stated that an ecological survey for an area should be conducted on comparative bases, particularly the heterogeneous to indicate a long term range. The study was carried out in the Borgu sector of Kainji Lake National Park. Already existing transects and trails transects was used for this study. Out of a total of ten (10) existing/ accessible transect in the Borgu sector of Kainji Lake National Park. Five transects Five transect namely, (A) Hussaini Masha track-45km, a Mixed *Deterium* woodland (B), Gilbert Child track - 44km, a *Terminalia* Riparian woodland , (C) Shehu Shagari track - 25km, a Riparian *Acacia* woodland, (D), Mamudu Lapai track -29km, a Mixed *Afzelia* woodland, and (E) Awal Ibrahim track -22km, an *Isoberlinia/ Afzelia* , were randomly selected for the study in the area. Transects length ranges between 22km to 45km.

Data Collection Techniques

Kobs were identified as described by Jean and Pierre (1990). Feeding observations followed the scanning focal point techniques as described by Altman (1994). The procedure initially involved general observations of all group members before focusing on one

individual seen to be most stable and easily identified. Feed plants and parts eaten by Kobs were identified through direct observations with the aid of Zeiss Dialyt Binoculars (10 x 40). Observations were made on several groups of Kobs that comprised between 4 and 12 individuals from an average distance of 20 m. A camera was used to take pictures of the plants eaten where necessary. Also a field guide book titled "A handbook of west African weeds" by Akobundu and Agyakwa (1989) was used to identify the plant species utilized by kob.

The following parameters were recorded as food items species, young leaves, mature leaves and flowers, a total of 192 h of direct observations were made from 20 km transect present in each of the five vegetation communities identified in the Park. Each transect was traversed twice in a month for a period of 24 months between May 2015 and June, 2017. Feeding observations were usually made between 07:00-12:00 h and 16:00-18:00 h, which was considered to be the peak activity period. Feed items were collected after the group had finished feeding and moved out of the site, a herbarium was prepared from them and later identified as described by Stanfield (1970), Lowe (1989) and Keay (1989).

Data Analysis:

Percentage plant and parts utilized as feed was calculated for each plant species as recommended by Alika (2006) as follows:

$$F_k = \frac{\sum Y_i}{n} \, x_{100}$$

eq. (1)

Where, F_k is the frequency for species K, Y_i is the incidence (presence or absence) of species K, n is the total number sampled.

Results

The result from this study showed that nineteen plant species were identified as feed components for kob population in the Park in both wet and dry seasons. Fourteen plant species were grazed and browsed in the wet season. Wet season forage utilization showed that *Andropogon gayanus* young leaves was the most utilized grass species with (18.02%) utilization, followed by *Gardenia aqualla* (6.31%) and *Grewia mollis* (5.86%) utilization (Table 1), while, the least preferred grass species includes *Acroceras zizanioides* (0.91%). Young leaf material was the most preferred part of plant species (59.45%), followed by matured leave material (26.13%), while bark of tree was the least preferred part of plant (0.91%) utilized

Table1: Plants and plant parts utilized as feed in wet season by *Kobus kob* in Kainji Lake National Park

S/no	Types of food eaten	Parts eaten					Part Utilized (%)				
		ML	YL	D L	F/SC	BT	ML	YL	D L	F/ SC	BT
1	*Acroceras zizanioides*	0	0	0	x	0	0	0	0.91	0	0
2	*Andropogon gayanus*	x	x	0	0	0	5.41	18.02	0	0	0
3	*Andropogon tectorum*	x	x	x	0	0	3.6	4.5	2.7	0	0
4	*Cyperus difformis*	0	x	0	x	0	0	3.6	0	1.8	0

		ML	YL	DL	F/SC	BT	ML	YL	DL	F/SC	BT
5	*Digitaria ciliaris*	x	x	0	0	0	3.6	1.8	0	0	0
6	*Echinochloa obtusiflora*	x	x	0	0	0	3.15	4.5	0	0	0
7	*Gardenia aqualla*	0	x	0	x	0	0	6.31	0	3.6	0
8	*Grewia mollis*	x	x	0	0	0	4.05	5.86	0	0	0
9	*Hyparrhenia rufa*	x	x	0	0	0	2.7	3.15	0	0	0
10	*Imperata cylindrica*	0	x	0	x	x	0	1.8	0	2.7	0.91
11	*Maranthes polyandra*	x	x	0	0	0	1.8	3.6	0	0	0
12	*Panicum Paucinode*	x	x	0	0	0	0.91	2.7	0	0	0
13	*Paspalum scrobiculatum*	x	x	x	0	0	0.91	2.7	1.8	0	0
14	*Pterocarpus erinaceous*	0	x	0	0	0	0	0.91	0	0	0
							26.13	59.45	5.41	8.1	0.91

Note x: Utilized, 0: Not Utilized ML=Mature leaves, YL =Young leaves, D L = Dry leaves, F/ SC = Fruits/ Soft seed coat, BT = Bark of tree

Dry season forage utilization by kob equally followed the same trend when compared with wet season forage utilization, in which sixteen plant species were utilized as feed by kob, *Hyparrhenia rufa* (12.87%) followed by *Afzelia africana* *(*9.36%) and *Panicum Paucinode* had (7.02%), while the least utilized is the *Acroceras zizanioides* having *(*0.58%) utilization only (Table 2). Young leaf material was the most preferred part of plant species (50.88%), followed by Fruits/ Soft seed coat material (19.88%), while bark of tree was the least preferred part of plant (1.17%) utilized.

Table 2: Plants and Plant Parts Utilized as Feed in Dry Season by *Kobus kob* in the Park

Types of food eaten	Parts eaten					Part Utilized (%)				
	ML	YL	D L	F/ SC	BT	ML	YL	D L	F/ SC	BT
Acroceras zizanioides	0		x	0	0	0	0	0.58	0	0
Afzelia africana	0	x	0	x	0		9.36		4.68	0
Andropogon tectorum	x	x	x	0	0	4.68	3.51	4.09	0	0
Cassia mimosoides	x	x	x	x	0	2.92	1.75	1.17	2.34	0
Cyperus difformis	0	x	0	x	0	0	0.58	0	0.58	0
Cyperus iria	0	0	0	x	0	0	0	0	1.17	0
Digitaria ciliaris	0	x	0	x	0	0	0.58	0	0.58	0
Grewia mollis	0	x	x	x	0	0	1.17	1.17	2.34	0
Hyparrhenia	x	x	0	0	0	3.51	12.87	0	0	0
Imperata cylindrica	x	x	x	x	0	1.17	3.51	1.17	1.17	0
Khaya senegalensis	0	x	0	x	x	0	2.34	0	3.51	1.17

Maranthes polyandra	0	x	0	x	0	0	4.68	0	2.34	0
Panicum Paucinode	x	x	x	0	0	2.34	7.02	2.92	0	0
Paspalum scrobiculatum	0	x	0	0	0	0	1.17	0	0	0
Pterocarpus erinaceus	0	x	x	x	0	0	1.17	2.34	1.17	0
Seteria sphacelata	0	x	0	0	0	0	1.17	0	0	0
						14.62	50.88	13.44	19.88	1.17

Note x: Utilized, 0: Not Utilized ML=Mature leaves, YL =Young leaves, D L = Dry leaves, F/ SC = Fruits/ Soft seed coat, BT = Bark of tree

The result on the Mean seasonal percentage utilization of forage plant species by Kob in Kainji Lake National Park (Figure1) shows that *Andropogon gayanus* is the most preferred food plant in the wet season having (23.43%) preference while *Grewia mollis* (16.38%) is most preferred in the dry season. *Acroceras zizanioides* is the least preferred food plant in both wet and dry seasons having low preference rate of 0.91% and 0.54% respectively.
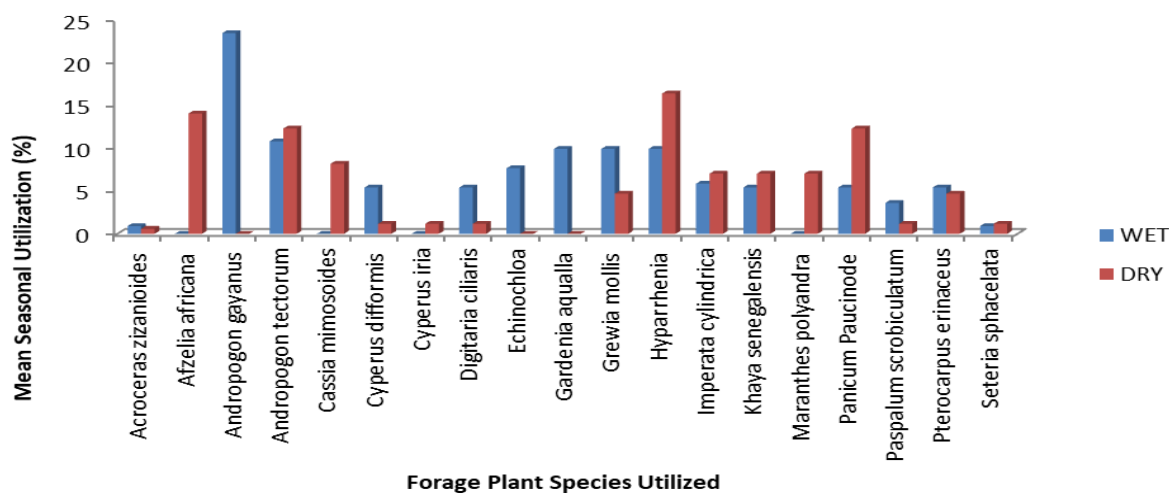

Figure 1: Mean Seasonal Percentage Utilization of Forage Plant Species by Kob in Kainji Lake National Park

Proximate composition of major grass species utilized as feed by kob in the Park indicated that *Andropogon gayanus* has a crude protein (7.60%) and fat contents (5.11%), while, crude fibre content is (35.10%) (Table 3).

Table 3: Proximate Composition of Major Feed Items Eaten by *Kobus kob* Population in the Park

Plant species	DM	CP	CF	FAT	ASH	NFE
1. Andropogon gayanus	33.5	7.60	35.10	5.11	9.42	42.77

2. *Andropogon tectorum*	39.4	6.26	32.11	4.77	8.65	48.21
3. *Cassia mimosoides*	31.3	6.10	30.00	3.09	5.67	30.43
4. *Echinochloa obtusiflora*	48.3	7.21	42.31	4.91	7.42	38.15
5. *Hyparrhenia rufa*	39.1	9.03	32.50	4.11	8.12	46.17

Adopted from Aremu and Onadeko (2008) : %DM: Percentage dry matter, %CP: Percentage crude protein, %CF: Percentage crude fibre, %NFE: Percentage nitrogen free extract

Discussion

The findings of the study revealed that the frequencies of feeding on *Andropogon gayanus* in wet season and *Andropogon tectorum* in wet and dry seasons by kobs explains why kobs are mostly grazers. *Grewis mollis, Maranthus polyandra*, and *Afzelia africana* were fed upon by kobs mostly during the dry season as browse plants. Agbelusi (1989) asserted that kob utilizes both browse and grass species and that that the grass species favoured by kob were mainly perennials thus making it possible for them to select herbaceous plants that are available all the year round.

Feed Selection and the Nutritional Values of Plant Species

The most preferred part of plants in both wet and dry seasons is the young leaf (59.45%) and (50.88%), respectively when compared to matured leaf (26.13 and 14.62%), respectively. This may not be unconnected to the fact that young leaves are more palatable, succulent and easy to digest making the feed nutrient easily available to animal for growth, maintenance of pregnancy and lactation (Voeten, 1999). Kobs only nib at the tip of the plant species; this may explain why ungulate preferred new flush of grasses from newly burnt rangelands where it can easily cut the leaf tip (Mwangi *et al.,* 1999; Aremu, 2001).

Mature leaves were less preferred by kobs population due to the fact that they are dry and coarse thereby hindering digestibility. These observations followed that of Holechek (1994) and Stoddart *et al.* (1995). Kobs in the park show grazing preference for swards of intermediate grass height and biomass, they are mixed feeders, changing from grazing in the rains to browsing in the dry season. Their habitats are varied and ranges from dense woodland and to open flood plains. These observations also followed that of (Fryxell *et al*. 2004). *Andropogon gayanus* was the most preferred grass species in the rainy season due to the fact that it contains high percentages of crude protein and fat 7.60 and 5.11%, respectively, which is above the 5% crude protein level in the vegetation that is required for African ungulates growth (Bothma 1996). While other grasses have high level of CP and lower fat content.

Conclusion

This study demonstrated that *Kobus kob* were selective grazers during the wet season and browsers during the dry season at the level of the feeding habitat. They are mixed feeders, switching between grazing during the wet season and browsing during the dry. The choice of grass species within feeding patches and the amount was influenced by seasonal changes in grass species quality. The results of this study show that *Kobus kob's* feeding habits are also influenced by seasonal and environmental changes.

Therefore, managers should examine the availability of food supplies in all areas of the park where kobs are present. For the park to increase the habitat potentials and to improve grazing opportunities for the *Kobus kob* population in the Park, most especially during dry season when the habitat resources are usually over stretched. There is therefore, the need to improve habitats quality through application of controlled burning programmes, planting of desirable grasses and prohibit illegal grazing by livestock within Park boundaries, to eliminate competition for limited habitat resources between wild and domestic animals.

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