

NUTRITIONAL EVALUATION OF THE PRINCIPAL FORAGES / FEED CONSUMED BY INDIAN RHINO (*RHINOCEROS UNICORNIS*) IN POBITORA WILDLIFE SANCTUARY AND ASSAM STATE ZOO-CUM-BOTANICAL GARDEN, ASSAM

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Abstract

Rhinos in Pobitora Wildlife Sanctuary principally feed on 22 species of grasses and plants, considering the seasonal variation on the availability of food sources. The proximate analysis of food revealed that they contain moisture (80-85%), crude protein (6-15%) and ash (10-15%). The rhinos in Assam State Zoo-cum-Botanical Garden are being maintained on a daily ration of green grasses (100kg), concentrate feed (7kg) and monthly supplements of minerals (500g). The chemical analysis of grass and feed mixture revealed that they contain moisture 11-80%, crude protein 7-18% and ash 5-14%.

Keywords

Indian rhino, nutritional evaluation, grasses, feed mixture, Pobitora Wildlife Sanctuary, Assam State Zoo-cum-Botanical Garden

Introduction

Studies on the feeding habits of Indian Rhinoceros *Rhinoceros unicornis* have shown that it is completely herbivorous (Grzimek, 1970; Laurie, 1978; Patar, 1980). Short and tall grasses, shrubs, herbs, leaves, twigs, aquatic plants and occasionally fruits make the principal diet of the species.

At present, Assam houses the world's largest surviving population of *R. unicornis*, which is threatened globally. During the last seven decades the Indian Rhino population showed a (hopefully) increasing trend, however, their area of occupancy dwindled in size. Although, the population of *R. unicornis* is highest in Assam, little efforts have been made to know about their feeding habits. Therefore, some baseline study on its feeding habits was considered essential.

The study on the nutritional composition of the principal forages of *R. unicornis* can provide an insight into the physiology of the species as well as help us in assessing the habitat. It will also be helpful in developing feeding strategies and optimal diets for the managed population.

Study area

Pobitora Wildlife Sanctuary is located in the flood plains of river Brahmaputra. The area of Pobitora Wildlife Sanctuary falls within 26°12'N to 26°15'N and 92°2'E to 92°5'E. The area of the Sanctuary is flat with gentle east to west inclination excluding Burh Mayong Hillock. The vegetation of the Sanctuary is classified into four distinguished forest types as per Champion and Seth (1968) -- eastern west alluvial grassland (1/4/4d/2S), Barriuglonia swamp forest (1/4/4d/5S), low alluvial savannah (*Salmania albizzia*) woodland (1/3/1S) and northern moist mixed deciduous forest (Burha Mayong Hillock) (1/3/3C/C/2S). According to the census report in 1999, there are 74 rhinos in Pobitora Wildlife Sanctuary in an area of only 16km² with the highest density of Greater One-horned Rhinoceros population.

The Assam State Zoo-cum-Botanical Garden situated in the heart of Guwahati City, is at present maintaining eight Indian Rhinos. The study was done on two adult males bearing International Studbook No. IS-173 and IS-174.

Methodology

Sources of data: The feed / forage samples were collected from Pobitora Wildlife Sanctuary, Assam in natural condition and from Assam State Zoo-cum-Botanical Garden in July 2001.

Collection of samples: Different forages from natural pasture consumed by animals during grazing was observed. Some short term observations were made by following rhinos as far as

possible to survey the varieties of plants they consumed. Plants fed by the rhinos were collected from places where they spent more than 10 minutes, usually of plants that had saliva or were torn on the top. The grasses were identified with the help of a taxonomist and botanical names were recorded.

In captivity, samples were collected from the offered feed mixtures and grasses. The proximate analysis of the collected samples was done according to AOAC (1990).

Results

The Indian Rhinos are generally grazers and occasional browsers. Their forages in Pobitora Wildlife Sanctuary are grasses, shrubs, tree leaves, aquatic plants and sometime fruits. The different species of plants that constitute the diet of *R. unicornis* are given in Table 1. During the observation it was found that rhinos mostly feed on 22 species of plants. Grasses comprise the major part of the total plants eaten. Out of the 22

species of plants, 11 species of grasses were recorded to be the most preferred food sources of the Indian Rhinos (Table 1). The chemical analysis of these grasses revealed that they contain 80-85% moisture, 6-15% crude protein (CP) and 10-15% ash (Table 3).

Rhinos in captivity were truly based on the offered feed mixture and grasses for their feeding. The animals were provided with green grass and feed mixture twice daily and 500g black salt was given monthly. The different food items available for *R. unicornis* in Assam State Zoo are:

- a) Grasses: *Hymenachae amplexicaolis*, *Brachiaria mitica*, *Kyllinga brevifolia**, *Cynodon dactylon** (*available in the enclosure)
- b) Concentrate feed mixture: Gram, black gram, wheat bran
- c) Fruits/vegetables: Banana, cabbage etc.
- d) Minerals: Common salt, commercial mineral salt.

The daily ration for *R. unicornis* at the zoo was computed as follows:

| | |
|---------------------|--|
| 1. Green grass | 100kg |
| 2. Concentrate feed | 6kg (gram 2kg, black gram 2kg, wheat bran 2kg) |
| 3. Banana | 8-10 nos. |
| 4. Vegetables | 2kg |
| 5. Common salt | 20g |
| 6. Mineral mixture | 500g |

The proximate analysis revealed that grasses contain 79-82% moisture, 7-9% protein and 10-11% ash, and the feed mixture contain 11-80% moisture, 14-18% CP and 5-24% ash. These are given in Table 4.

Discussion

The sources of food items of *R. unicornis* were studied in natural condition in Pobitora Wildlife Sanctuary. It was clear from the study that the food items of *R. unicornis* were green grasses and plants. Similar observations were also reported by Grzimek (1970), Laurie (1978), Patar (1980) and Bhattacharya (1991). *R. unicornis* was found to consume long grasses like *Vetiveria zizanoides*, *Saccharum* spp., *Phragmites karka*, *Selerostachya fusca*, *Hymenachane* spp., short grasses like *Hemerthia compressa*, *Leersia hexandra*, *Pollinia cilata* etc., aquatic plants like *Hogol*, Water hyacinth, *Ipomea* spp., *Helochi* etc., tree saplings of *Dimoru*, *Ghunsa* and fruits of *Solanum carolinense*. These findings were in congruence with the findings of Laurie (1978) in Nepal, Bhattacharya (1991) and Mary *et al.* (1998) in Kaziranga National Park. These workers also reported the abundance of the same which are found in Pobitora Wildlife Sanctuary, although they have conducted their study in Royal Chitawan National Park, Nepal and Kaziranga National Park.

Table 1. Principal and most preferred food plants of *R. unicornis* in Pobitora Wildlife Sanctuary with the local names

| Localname | Botanical name |
|-----------------------|--|
| <u>Grasses</u> | |
| <i>Birina</i> * | <i>Vetiveria zizanodes</i> (L.) Wash. |
| <i>Khagori</i> * | <i>Saccharum spontaneum</i> |
| <i>Ekora</i> * | <i>Selerostachya fusca</i> (Roxb.) Ridley |
| <i>Nal</i> * | <i>Phragmites karka</i> (Retz.) Trin. |
| <i>Bamdal</i> * | <i>Andropogon</i> spp. |
| <i>Locusa</i> * | <i>Hemerthia compressa</i> |
| <i>Dal</i> * | <i>Hymenachae amplexicaolis</i> |
| <i>Arali</i> * | <i>Leersia hexandra</i> Sw. |
| <i>Dub grass</i> * | <i>Cynodon dactylon</i> (L.) Pers. |
| <i>Keya ban</i> | <i>Cyperous rotundus</i> |
| <i>Barkeya ban</i> | <i>Eleusina indica</i> (L.) Gaerth |
| <i>Hogol</i> * | Not identified |
| <i>Ulu ban</i> * | <i>Imperata cylindrical</i> (L.) P. Beauv. |
| <i>Son kher</i> | <i>Pallinia cilata</i> |
| <i>Kathia</i> | <i>Oryza sativa</i> (seedling) |
| <u>Aquatic plants</u> | |
| <i>Meteka</i> | <i>Eichornia crassipes</i> |
| <i>Kalmou</i> | <i>Ipomea reptans</i> |
| <i>Helonchi</i> | <i>Enhydrafluclians</i> |
| <u>Treesaplings</u> | |
| Era | |
| Dimoru | |
| Ghunsaplant | |
| <u>Fruits</u> | |
| Kata Bengena | <i>Solanum carolinense</i> |

*most preferred plants

Table 3. Chemical compositions of preference status of food plants of *R. unicornis* in Pobitora Wildlife Sanctuary (in percentage).

| Local name | Botanical name | DM | Moisture | CP | Ash |
|------------------|--|------|----------|------|-------|
| <i>Birina</i> | <i>Vetiveria zizaniodes</i> | 19.1 | 80.9 | 6.7 | 15 |
| <i>Khagori</i> | <i>Saccharum spontaneum</i> | 19.5 | 80.5 | 6.82 | 11.2 |
| <i>Ekora</i> | <i>Selerostachya fusca</i> | 15.5 | 84.5 | 6.2 | 12.7 |
| <i>Nal</i> | <i>Phragmites Karka.</i> | 15 | 85 | 6.3 | 11.8 |
| <i>Bam dal</i> | <i>Andropogon spp. Hemarthia compressa</i> | 18 | 82 | 6.55 | 9.2 |
| <i>Locusa</i> | <i>Hymenachae amplexicaolis</i> | 17 | 83 | 6.33 | 12.3 |
| <i>Dal</i> | <i>Leersia hexandra</i> | 15.8 | 84.2 | 6.5 | 10.33 |
| <i>Arali</i> | <i>Cynocoron dactylon</i> | 18.9 | 81.1 | 7.1 | 11.9 |
| <i>Dub grass</i> | <i>Not identified</i> | 16 | 84 | 15.2 | 12 |
| <i>Hogol</i> | <i>Imperata cylindrical.</i> | 17 | 83 | 6.2 | 11 |
| <i>Ulu ban</i> | | 19 | 81 | 5.5 | 8.2 |

The samples collected during the study in natural conditions were found to contain 80-85% moisture, 6-15% CP and 10-15% ash. However, Ranjhan (1991) stated in his publications that these grasses contain 72-84% moisture, 4-22% CP and 10-17% ash. These variations might be due to soil type and other ecological factors.

The rhinos in captivity have been maintained on a daily ration of green grass (100kg), concentrate feeds (7kg) and monthly supply of minerals (500g) for licking. Crandall (1964), Grzimek (1970) observed this type of rationing in different zoos and Bhattacharya (1991) also observed such rationing in Assam State Zoo cum Botanical Garden. The chemical analysis of grass that are offered to captive Rhinos is similar to that reported by Ranjhan (1991).

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Table 4. Chemical compositions of different types of feeds / forages offered to *R. unicornis* in captivity (in percentage)

| Local name | Botanical name | DM | Moisture | CP | Ash |
|---------------------|---------------------------------|------|----------|------|------|
| <u>Grasses</u> | | | | | |
| <i>Dal</i> | <i>Hymenachae amplexicaolis</i> | 20.9 | 79.1 | 7.1 | 11.9 |
| <i>Para</i> | <i>Brachiaria mutica</i> | 18 | 82 | 9 | 10.3 |
| <u>Feed mixture</u> | | | | | |
| Wheat bran | - | 88.9 | 11.1 | 14.7 | - |
| Black gram | <i>Phaseolus mungo</i> | 100 | - | 15 | 5.1 |
| Cabbage | <i>Brassica oleracea</i> | 20 | 80 | 18 | 24.2 |