

## **Okapi (*Okapia johnstoni*) SSP Feeding guidelines.**

This information is taken directly from Feeding guidelines proposal for okapis; a joint European and North American project by Sue Crissey, Ellen S. Dierenfeld, Johan Kanselaar, Kristin Leus, Joeke Nijboer. Reviewed by AZA Nutrition Advisory Group. May, 2001.

Cite Reference:

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### **Introduction**

North American and European okapi nutrition advisors collected information on and compared okapi diets fed in North American and European zoos. The data also were compared with available data from studies of captive okapi offered natural food items in the Democratic Republic of Congo (formerly Zaire). Based on these findings and other information described in that paper, recommendations for feeding okapis are being provided to the Okapi SSP.

Natural feeding ecology.

In the wild okapis appear to be very selective browsers with a preference for high quality, foliage tips from a number of light-dependent plants/trees mostly found in tree-fall gaps or along the edges of larger clearings (Hart and Hart, 1988). The consumption of plant fruit has not been reported. However comprehensive data on the total diet is lacking and little is known about the actual nutrient composition of the total diet consumed in nature.

Physiological parameters.

The prehensile tongue of the okapi, similar to the giraffe, allows it to browse on the more highly digestible, more succulent portions of plants. The digestive tract of the okapi is that of a ruminant, a trait that it shares with a large number of domestic and wild species of animals such as cattle, sheep, goats, deer, giraffe and antelope. Ruminants such as the okapi possess a voluminous, highly compartmentalized stomach which allows fermentation and digestion of roughage (Stevens and Hume, 1995). These animals also ruminate or chew a regurgitated bolus of ingesta which further reduces particle size (Butterworth, 1987).

### **Domestic animal nutrient requirements and probable exotic animal nutrient requirements.**

For okapi, as with most captive exotic species, nutrient requirements per se have not been studied. Information from the AZA Nutrition Advisory Group in Fact Sheet 006 (Lintzenich and Ward, 1997) was utilized for dietary protein, vitamin, and mineral levels. It is suggested that food intake on a dry matter basis be 2% of body mass of the okapi. Dry matter intake in European held okapi was 1.8% of body weight. Thus the dry matter intake for an average okapi weighing 235 kg should be about 4.23 kg/day. DM fed to European okapis (4615 gms) averaged about 2.0% of body weight. North American okapi (5626 gms) were fed about 2.4% of body weight fed. Thus depending on the sorting of leaf and stems the amount offered is more than the dry matter intake.

### **Animal food preference, consumption data and the nutrient content of foods.**

In North American zoos okapis are fed alfalfa (*Medicago sativa*) hay, browse (cuttings from trees and shrubs) and a variety of greens (for example: lettuce, kale, spinach), vegetables (for example: carrots, yams/sweet potatoes), fruits (for example: apples) and a nutritionally complete or formulated pellet.

A number of behavioral studies have been performed with captive and free-ranging okapis. None have focused specifically on okapi food interactions. Given this species' special adaptations for procuring and digesting food, manipulation of browse and rumination are important considerations in selecting the physical form of food items offered. This highlights the importance of offering forage items that can be manipulated by the tongue, and long fiber fractions, from hay and browse conducive to proper rumination.

### **Diet recommendations**

These nutrient guidelines are for the entire diet fed to okapis (see Table). These nutrients should be provided by a combination of foods including: commercial pellet, hay/forage and produce and browse.

With respect to food groups offered, the diet should consist of at least 25% pelleted diet and at least 50% of alfalfa and browse should be fed. Zero to no more than 25%, by weight, of the total diet intake should consist of produce.

#### **Water and salt**

While not studied specifically it is required that all okapi must have access to good quality water available at all times. Additionally, it is recommended that okapi have available as an iodized salt (NaCl) block. A trace mineral block is not necessary with this diet regime.

#### **Produce**

Produce is not required in the diet. Free-ranging okapi do not consume fruits or produce type foods. There is no behavioral need identified for offering produce to okapis. However, some animal managers use small amounts of produce as reinforcement in training sessions or to hide oral medications. Produce in the diet has no apparent harmful effects unless provided at level that would interfere with the consumption of the nutritionally important foods or at a level that would cause dilution of the nutrients in the total diet. Thus, the quantity of produce in the diet can be zero up to 25% on an as-offered basis.

#### **Commercial Pellets (often called grain)**

Because it is felt that commercial pellets/grain can provide the nutrients lacking in hay, at least 25% of the total diet should be pellets that are formulated to compliment the nutrients in hay. It is essential that each holding institution routinely chemically analyze their hay. Protein, fat, some of the vitamins and all minerals must be supplied in adequate amounts to these animals daily. Specifications for pellet manufacture must insure that these nutrients are included. To provide a total diet that meets the guidelines in the Table, the following is a suggested formula for nutrient composition of the pellet/grain: Crude protein 17.0 %, lysine 0.8 %, NDF 20-35%, ADF 13- 18 %, crude fat 3.0 %, linoleic acid 1,0 % and ash 7.0 %.

Recommended levels for minerals are Ca 0.65-0.90 % (maximum when fed alfalfa hay in addition to the pellet), P 0.65 -0.9 %, Na 0.3 %, K 1.1 %, Mg 0.2 %, S 0.2 %, Zn 135 ppm, Cu 20-30 ppm, Fe 100 ppm, Co 0.35 ppm, Se 0.3 ppm and Mn 90 ppm. Advised minimal levels for vitamins are: thiamin 8 ppm, riboflavin 9 ppm, pantothenic acid 20 ppm, niacin 40 ppm, choline 1200 ppm biotin 200 ppb, vitamin B12 20 ppb, vitamin A 5000 IU/kg, vitamin D3 1200 IU/kg and vitamin E 400 IU/kg

#### **Forage (hay)**

At least 50% of the total diet fed should be a high quality (very leafy; >16% crude protein), alfalfa. Hay will provide nutrients as well as fiber needed for gut function. Quality should be determined by chemical analysis. Browse can be an important component of the diet and can actually replace some of the forage component if chemical composition is known and appropriate quantities are consumed.

### **Quantity offered and consumed**

Okapis should consume at least 1.8% of their body weight (in DM) daily. This means they must be offered more than this, from 2 to 2.4% of body weight. Depending on the quality of the hay, they may need more or less. Studies with okapi (Saambili and Ruf, 1995) have shown that lactating females in particular may require a greater intake. For growing and active animals, additional quantities may be offered. If hay quality is poor with respect to either nutrients or digestibility, more food must be consumed. However, since there is a limit to gut capacity, a high quality diet is important.

### **Literature cited**

Butterworth, M.H. Wild and domestic ungulates. Pp. 127-136 in Johnson, H.D. (ed). Bioclimatology and the adaptation of livestock. Elsevier Science Publishers B.V., Amsterdam, 1987.

Hart, J.A., Hart, T.B. A summary report on the behavior, ecology and conservation of the okapi (*Okapia johnstoni*) in Zaire. ACTA ZOOLOGICA ET PATHOLOGICA ANTVERPIENSIA, 80:19-28, 1988

Lintzenich, B. A., Ward, A. M., Hay and pellet ratios: Considerations in feeding ungulates. Fact Sheet 006 in: Nutrition Advisory Handbook. September, 1997.

Saambili, K. and Ruf, K. Food and Water Intake variations during lactation periods of two okapi at the Epulu Station. EPULU UPDATE dated 15 March 1995. White Oak Plantation, Yulee, FL

Recommended nutrient profile for captive okapi diets.

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Suggested Diet %

50% prime quality alfalfa hay (minimum)

25% nutritionally complete pellets (minimum)

0-25% produce/browse (maximum)

Intake as % Body mass: 1.8% Dry matter diet

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Nutrient	Concentration range dry matter basis
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Protein, %	17-20
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NDF, %	20-35
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ADF, %	13- 18
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Vitamin A, IU/g	1.5-2.2
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Vitamin D, IU/g	0.4-0.5
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Vitamin E, IU/kg	120-178
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Thiamin, mg/kg -	
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Riboflavin, mg/kg	-
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Calcium, %	0.70-0.97
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Phosphorous, %	0.36-0.40
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Magnesium, %	0.18-0.24
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Potassium, %	1.6-1.8
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Sodium, %	0.10-0.44
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Iron, mg/kg	126-139
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Zinc, mg/kg	54-68
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Copper, mg/kg	10-12
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Manganese, mg/kg	54-57
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Selenium, mg/kg	0.12-0.18
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Iodine, mg/kg	0.3-0.4
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Please note that the micro-nutrient levels suggested are simply a summary of data from other non-domestic ruminants that appears to be adequate.

NDF= neutral detergent fiber; ADF= acid detergent fiber