EVALUATION OF BROWSE COMPOSITION: VITAMIN E

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Abstract

Vitamin E is an important antioxidant, and deficiency is known to impact the reproduction, growth, and immunity in many species. Dietary browse can be an important source of vitamin E for animals housed in zoological institutions; however the contribution of these items to total dietary vitamin E likely varies by browse species and across time. Our objective was to evaluate this variation utilizing browse harvested at Disney's Animal Kingdom. Samples of select browse species were collected monthly over the course of one year (June 2014 to May 2015) during periods of inclusion within animal diets: whole stalk, including leaves, of elephant grass (*Pennisetum purpureum*; n = 30 samples; 3 samples/mon for 10-mon); leaves of Japanese blueberry (*Elaeocarpus sylvestris; n* = 36 samples; 3 samples/mon for 12-mon); and branches, including leaves, of willow (*Salix caroliniana; n* = 33 samples; 2 to 3 samples/mon for 12-mon). We utilized Covance laboratories for vitamin E analysis (Table 1), and Dairy One laboratories for proximate analysis (Table 2).

Elephant grass stalks (*Pennisetum purpureum*): Vitamin E concentrations (78.8 ± 21.9 mg/kg DM; Range: 0 to 281 mg/kg DM) in elephant grass stalks varied; however they were not significantly different ($P > 0.10$) across time. Mean vitamin E concentrations of elephant grass stalks were the lowest among the species each month, being similar ($P > 0.10$) to willow concentrations only in January, February, and May.

Japanese blueberry leaves (*Elaeocarpus sylvestris*): In general, vitamin E increased steadily from June (464 ± 60 mg/kg DM) to December (1931 ± 69 mg/kg DM), and decreased steadily from December to May (492 ± 69 mg/kg DM). However, in October (457 ± 69 mg/kg DM), vitamin E concentrations were lower than expected, while in April concentrations were (1132 ± 69 mg/kg DM) higher than expected. Mean vitamin E concentrations of Japanese blueberry leaves were the highest among the species each month, being similar ($P > 0.10$) to willow concentrations in June, July, and October.

Willow branches (*Salix caroliniana*): In general, mean Vitamin E concentrations of willow branches were highest between June and November (391 to 577 mg/kg DM) versus December to May (117 to 320 mg/kg DM). Concentrations peaked in September, and were lowest in February. Mean vitamin E concentrations of Willow branches were intermediate among the species each month.

An understanding of vitamin E concentrations over time in browse is important for optimization of dietary formulations for animals housed in zoological institutions. For example, herein we

found that contribution of Elaeocarpus to dietary vitamin E would be more than 4 times higher utilizing data from December compared to data from June. These data highlight the importance of spacing quality control samples for browse species overtime to ensure an adequate representation of dietary vitamin E concentrations are obtained.

Table 1. Vitamin E of three browse species collected monthly over the course of one year (June 2014 to May 2015).

Vitamin E, mg/kg DM	**Japanese Blueberry** *Elaeocarpus sylvestris*	**Elephant Grass** *Pennisetum purpureum*	**Willow** *Salix caroliniana*
LS Mean ± SEM	971.6 ± 20.2	78.8 ± 21.9	348.5 ± 22.3
Range	319.0 to 2319.5	0.0 to 281.3	114.8 to 814.3

Table 2. Nutrient composition of three browse species collected monthly over the course of one year (June 2014 to May 2015).

Nutrient	**Japanese Blueberry** *Elaeocarpus sylvestris*	**Elephant Grass** *Pennisetum purpureum*	**Willow** *Salix caroliniana*
Dry Matter (DM), %	34.2 ± 3.5	22.0 ± 3.5	35.2 ± 5.2
Gross Energy cal/g DM	4670.4 ± 137.0	4515.9 ± 153.1	4978.5 ± 122.0
Crude Protein, % DM	13.2 ± 2.1	9.8 ± 2.3	10.3 ± 1.9
Crude Fat, % DM	3.6 ± 0.4	3.0 ± 0.4	3.0 ± 0.8
ADF, % DM	21.3 ± 4.0	38.3 ± 2.8	38.5 ± 4.8
NDF, % DM	35.3 ± 5.3	68.7 ± 3.6	48.9 ± 5.2
Lignin, % DM	8.7 ± 2.0	3.7 ± 1.1	13.8 ± 1.6
Starch, % DM	6.4 ± 4.4	0.5 ± 0.3	1.8 ± 1.1
Water Soluble Carbohydrate, % DM	20.5 ± 5.3	8.3 ± 1.4	13.2 ± 3.2
Simple Sugars (ESC), % DM	11.5 ± 3.9	6.6 ± 1.9	8.8 ± 2.0