

THE NUTRIENT PROFILE OF PRODUCTS AVAILABLE FOR HAND REARING ASIAN ELEPHANTS (*ELEPHAS MAXIMUS*)

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Abstract

Asian elephant neonates that fail to nurse from their dams continue to be challenging to hand rear (Takehana *et al.*, 2020; Wiedner, 2023). The nutrient content of maternal milk should be used to formulate diets for hand rearing. Often these data do not exist, are incomplete, or are based on limited samples sizes, making extrapolation challenging. Furthermore, often the ingredients available do not adequately match the nutrient content of maternal milk. Average fat, protein, and sugar (lactose) levels over the first 6 months of lactation (three cows, including two consecutive lactations in one cow, M. Power, unpublished data) were used as targets to assess hand rearing products. These targets, on a dry matter basis for percent fat, protein, sugar \pm standard deviation were: 38.97 ± 6.70 , 18.46 ± 3.29 , 28.36 ± 5.86 , respectively. Taking into account sugar includes several carbohydrates and oligosaccharides makes up approximately 40% of the total sugar with lactose and other less complex sugars making up the rest (Kunz, *et al.*, 1999; M. Power, personal communication, July 11, 2023), 20% lactose was set as a maximum for formulation. Additional targets were set for fatty acids and calcium and phosphorus. Medium chain triglycerides were based on a limited sample size (one cow, three to six months, Rietkerk *et al.*, 1993) specifically 2.42% caprylic acid (C8), 18.58% capric acid (C10) and 9.61% lauric acid (C12), on a dry matter basis. Calcium and phosphorus targets were determined from Abbondanza *et al.* (2013) suggesting whether early (three months) or late (thirty months) lactation, the calcium to phosphorus ratio was approximately 2:1 and ranged from 0.51 to 1.02 % calcium and 0.26 to 0.51% phosphorus on a dry matter basis, respectively. The analyzed or calculated values for products available vary significantly (Table 1).

Literature Cited

Abbondanza FN, Power ML, Dickson MA, Brown J, and Oftedal OT (2013) Variation in the composition of milk of Asian elephants (*Elephas maximum*) throughout lactation. *Zoo Biol* 32:291-298.

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Takehana K, Kitani R, Hatate K, Onomi R, and Yamagishi N (2020) Anthropometric and blood data on a hand-reared captive Asian elephant (*Elephas maximus*) calf: a retrospective case report. *J Vet Med Sci* 82(7):943-947.

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Table1. Range of nutrients contained in Fox Valley 30/50, 25/30 mixed 24% and 76%¹, Grober Asian Elephant-Gro², Mazuri Asian Elephant Milk Replacer³, NuZu Elephant Milk Replacer⁴, and Wombaroo Asian Elephant⁵.

Nutrient	Level in sample (s), DM Basis
Dry matter, %	98.03-98.86
Protein, %	20.31-28.98
Fat, %	32.63-45.70
Lactose, %	11.27-23.12
Caprylic acid, %	0.68-4.82
Capric acid, %	0.67-4.51
Lauric acid, %	4.77-12.19
Calcium, %	0.86-1.27
Phosphorus, %	0.59-0.98
Ca:P ratio	1.13-2.08

¹Fox Valley Animal Nutrition Inc., P.O. Box 1666 Sun City, AZ 85372; analyzed values.

²Grober Nutrition Inc. Cambridge, Ontario N1T154; analyzed values.

³Mazuri Exotic Animal Nutrition, PMI Nutrition International LLC, 4001 Lexington Ave, North Arden Hills, MN 55126; calculated values.

⁴NuZu Feed, Anderson Feed Company, 3338 S. Chana Rd. Chana, IL 61015; analyzed values.

⁵Wombaroo, P.O. Box 151 Glen Osmond South Australia 5064 Australia; analyzed values.