

HAND-REARING OF A STRAW-COLORED FRUIT BAT (*EIDOLON HELVUM*) PUP AT TORONTO ZOO

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Abstract

On January 28, 2023, a male straw-colored fruit bat pup (*Eidolon helvum*) was orphaned at 2 days of age at Toronto Zoo. The pup, weighing 50 g, was determined to be in good health and the decision was made to hand rear. A formula using a combination of goat milk replacer and kangaroo milk replacer was used to target the nutrient compositions of other bat and flying fox species. LACTEEZE DROPS were initially added to the formula to mitigate potential issues with lactose and later reduced. The pup was gradually transitioned from feeding every 2 hours to longer intervals over 15 weeks to stimulate normal developmental milestones. The formula-to-water ratio was gradually increased to manage energy supply and growth and mimic changing nutrient compositions in milk of related species. Fruit puree (apple and pear) were introduced starting at 4 weeks of age. Larger fruit and vegetable pieces were introduced starting at 6 weeks of age. Daily produce amounts were gradually increased from week 7 to 15. At 13 weeks of age, ground Mazuri Softbill Diet was added to the diet. The pup exhibited an average daily growth rate of 1.6 grams per day from 0 to 16 weeks of age, following a typical growth curve for a straw-colored fruit bat. At week 16, the pup was reintroduced to 4 females and 2 parent reared juveniles. Body condition score and weight will be reassessed along with parent-reared pups to evaluate the success of the hand-rearing protocol before reintroduction to the larger colony in Summer 2023.

On January 28, 2023, a male straw-colored fruit bat pup (*Eidolon helvum*) was orphaned at 2 days of age at Toronto Zoo. The 50 g pup was deemed to be in good health by veterinary staff and the decision was made to hand rear. A commercially available goat milk replacer (Kid-Gro Kid Milk Replacer, Grober Nutrition Inc., Cambridge, ON, CA) was used initially (Table 1). At approximately 3 weeks of age, a kangaroo milk replacer (Wombaroo Kangaroo Milk Replacer > 0.7, Wombaroo Food Products, Mt Barker, South Australia) was combined with the goat milk replacer to increase the fat content to more closely match milk nutrient compositions reported for *Rousettus aegyptiacus* (Jorine & Arad, 1999), Old World Fruit Bats (Iverson, 2007), and for *Pteropus poliocephalus* (Messer & Parry-Jones, 1997). The ratio of formula to water was increased gradually to manage energy supply and growth and mimic changing nutrient compositions in milk of related species. LACTEEZE DROPS (LACTEEZE, Mississauga, ON, CA) were added during the first week at 1 drop per 68 grams of formula and then decreased to 0.5 drop per batch of formula thereafter. Initially the pup was offered warmed formula every 2 hours, and this interval was gradually extended over the course of 15 weeks.

At 4 weeks of age, 30 g of fruit puree (equal parts apple and pear) was introduced. This continued until the pup was fully weaned at 15 weeks of age. At week 6, 20 grams of larger fruit and vegetable pieces were introduced. Produce varieties offered included: apple, banana, cantaloupe, cucumber, grape, green pepper, kiwi, honeydew melon, romaine lettuce, mango, orange, tomato, and zucchini. Daily produce amounts were gradually increased from week 7 to 15 (week 7: 30 g/d, week 8: 50 g/d, week 13: 225 g/d, week 14: 240 g/d). At 13 weeks, 5 g/d of ground Mazuri Softbill

Diet (5M12) was introduced, sprinkled over fruit chunks. Formula continued to be offered at decreasing volumes and frequencies from weeks 12 to 15.

The pup grew an average of 1.6 grams per day from 0 to 16 weeks of age (Figure 1), following a similar growth curve for this species (Barnard, 2010). At week 16, the pup was re-introduced to 4 females and 2 parent reared juveniles of approximately the same age. To evaluate the success of the hand rearing protocol, the body condition score and body weight of the pup will be re-assessed along with those of the two parent reared pups in summer 2023, before being re-introduced to the larger colony.

Literature Cited

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Table 1. As fed nutrient values of milk replacer formula utilized for hand-rearing a straw-colored fruit bat (*Eidolon helvum*) at Toronto Zoo, compared with literature reported bat and grey-headed flying fox milk values.

	Lactation Phase	Solids %	Protein %	Carbohydrate %	Fat %
<i>Toronto Zoo Formula</i>	Week 1-2	11.7	2.7	4.2	2.9
	Week 3	11.6	3.0	3.8	3.5
	Week 4	12.0	3.1	3.5	3.9
	Week 5	12.7	3.3	3.7	4.2
	Week 7-12	13.8	3.4	5.3	4.3
	Week 12-15	14.3	3.6	5.5	4.4
<i>R. aegyptiacus</i>	Early		2.2	5.7	2.7
	Mid	12.0-20.0	2.3	6.1	7.1
	Peak		2.9	5.5	9.0
Old World Fruit Bat	Across lactation	13.0-20.0	2.0-3.0	6.0	6.0-10.0
<i>P. poliocephalus</i>	Captive	11.1	2.59	6.13	1.9
	Wild	12.7	3.64	6.44	2.2

¹(Jorine & Arad, 1999)

²(Iverson, 2007)

³(Messer and Parry-Jones, 1997)

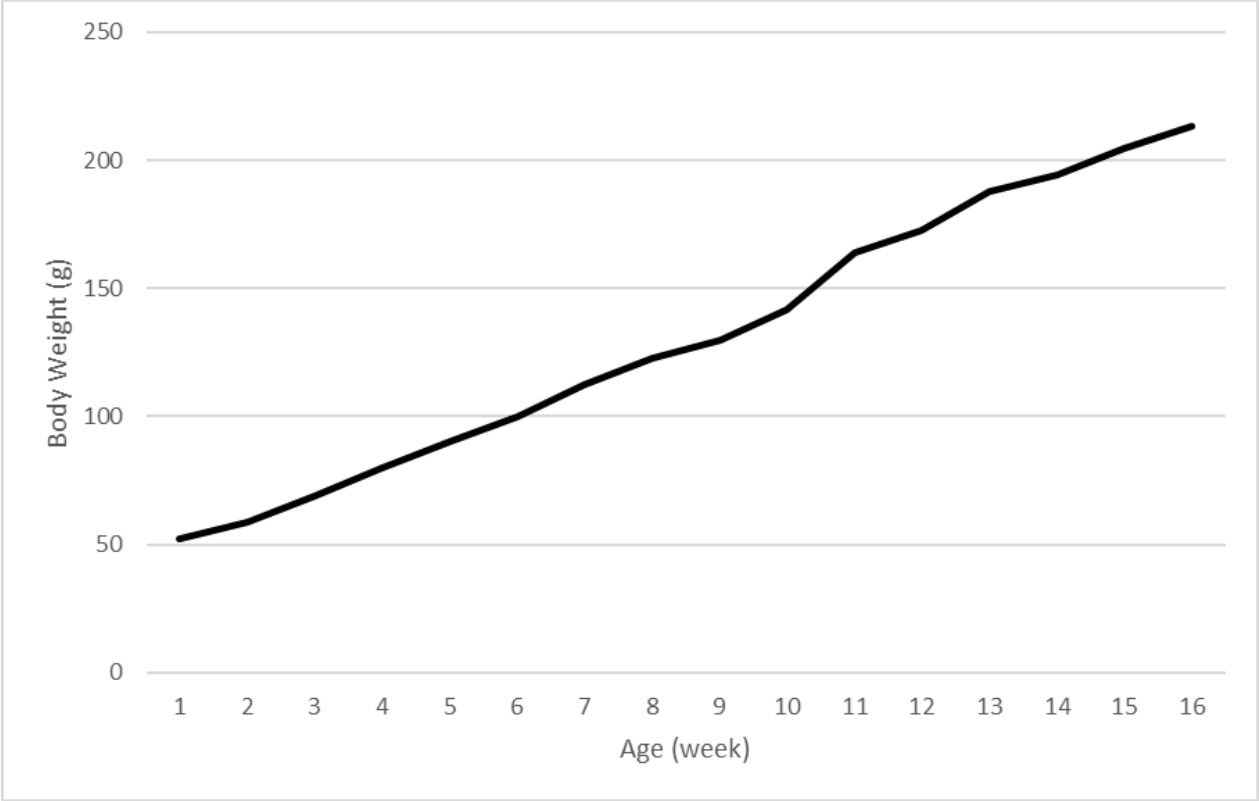


Figure 1. Body weight (g) by age (week) of a straw-colored fruit bat (*Eidolon helvum*) during hand-rearing at Toronto Zoo.