

HAND-REARING GIRAFFE (*GIRAFFA CAMELOPARDALIS TIPPELSKIRCHI* AND *GIRAFFA CAMELOPARDALIS RETICULATA*) AT TWO NORTH AMERICAN ZOOLOGICAL INSTITUTES

Ann M. Ward, MS¹ and Katrina M. Eschweiler MS^{2}*

¹*Fort Worth Zoological Association, Nutritional Services, 1989 Colonial Parkway, Fort Worth, TX 76110, USA.*

²*Fresno Chaffee Zoo, Nutrition Department, 894 W Belmont Ave, Fresno, CA 93728, USA*

Abstract

At Fort Worth Zoo (FWZ) in 2007, 1.0 reticulated giraffe (*Giraffa camelopardalis reticulata*), was hand-reared on a cow's milk formula. Subsequent calves hand-reared in 2021 (0.1), 2022 (1.0), and 2024 (0.1), the formula was changed to better mimic dam's milk using Zoological Milk Matrix 30/52 (ZL 30/52) and evaporated milk. Fresno Chaffee Zoo (FCZ) hand-reared 1.0 *Giraffa camelopardalis tippelskirchi* in 2023 on a similar formula of Zoological Milk Matrix 30/52 and Lactaid (Table 1). FCZ added Probios multispecies powder and FWZ added Lacteeze or Colief to their formulas.

Colostrum provision varied by product and days fed. Sources of colostrum included fresh bovine colostrum, giraffe plasma, colostrum replacer products (Ultra Start 150, Milk Products LLC, 435 East Main Street, PO Box 150, Chilton, WI 53014; Land O Lakes Colostrum Replacer) fed from 5-14 days. All FWZ calves started with five feedings quickly dropping to four by 2-3 weeks of age, while the FCZ calf started on four feedings. Calf daily consumption reached a maximum of 8-11% of body weight (BW) around three weeks for the calves on the ZL 30/52 formulas, while the calf on cow's milk reached maximum consumption of 10% on day 6. Consumption dropped to 4-5% BW between 3-5 months, with all animals down to two feedings by five months with the exception of one FWZ calf that was euthanized with sand impaction at 4.3 months. Within this range, the FCZ calf had the highest consumption for the longest amount of time, still receiving 3% of body weight for the last feed, while the FWZ calves were down to 1% of BW. Kcals maxed at five months for the FWZ ZL 30/52 calves at approximately 5500 kcals and 4650 kcals for the cow's milk calf. The FCZ calf reached maximum kcals at seven months at 9106 kcals. Solids were introduced around 1.5 months (FCZ) and between 2 and 3 months (FWZ). The calves on ZL 30/52 formula were weaned at approximately eight months while the calf on cow's milk was weaned at seven months.

Average daily gain (ADG) for the ZL 30/52 calves ranged from 0.734 to 1.152 kg/d, while ADG was 0.531 kg/d for the cow's milk calf. ADG for three of the ZL 30/52 calves exceeded those reported for hand-reared giraffe beyond 3.5 months at <0.854 kg/d (Meuffels *et al.*, 2019). Two of the ZL 30/52 calves ADGs' exceeded those reported for parent-reared giraffe 0.87-1.05 kg/d (Meuffels *et al.*, 2019) and were similar to parent-reared giraffe at the FWZ, 1.038 ± 0.106 kg/d, n=8 (unpublished data). There did not appear to be a difference between male and female parent-reared calves for the time period measured in either the review by Meuffels *et. al* (2019) or in the FWZ data (Figure 1).

The ZL 30/52 based formula is more similar to giraffe milk than a cow's milk formula and resulted in growth rates comparable to parent-reared giraffe. Consumption of a lower energy formula combined with earlier weaning and later introduction of solids would have contributed to the significantly lower ADG in the cow's milk calf. Meuffels *et al.* (2019) hand-reared calves on cow's milk formulas also did not achieve ADGs over the complete hand-rearing time period similar to parent-reared animals.

Literature Cited

- Meuffels J, Ververs D, Pootoolal J, Van Sijll Langhout M, & Govaere J (2019) Growth, husbandry, and diets of five successfully hand-reared orphaned giraffe calves (*Giraffa camelopardalis rothschildi* and *Giraffa camelopardalis reticulata*). *Journal of Zoo and Wildlife Medicine* 50(1):205-218.
- Osthoff G, Hugo A, Madende M, Deacon F, & Nel PJ (2017) Milk composition of free-ranging red hartebeest, giraffe, Southern reedbuck and warthog and a phylogenetic comparison of the milk of African Artiodactyla. *Comparative Biochemistry and Physiology, Part A* 204:93-103.
- Petzinger C, Murtough K, & Power ML (2013) Milk composition of the reticulated giraffe (*Giraffa camelopardalis reticulata*) through lactation. In Ward, A, Coslik, A, Mahan, K, Treiber, K, Reppert, A, Maslanka, M, Eds. *Proceedings of the Tenth Conference on Zoo and Wildlife Nutrition*, AZA Nutrition Advisory Group, Salt Lake City, Utah.

Table 1. Nutrient composition (as fed basis) of giraffe milk and hand-rearing formulas fed at the Fort Worth Zoo and Fresno Chaffee Zoo.

Nutrient	Dam's milk ¹	Dam's milk ²	Cow's Milk Formula ³	FWZ 30/52 Formula ⁴	FCZ 30/52 Formula ⁵
Protein, %	4.90±0.86		3.41	4.74	4.73
Fat, %	7.94±1.72	11-5.9	3.78	6.22	6.17
Lactose, %	3.62±0.29		4.55	4.22	0.16
Moisture, %	80.15±2.82	74.3-82.1	87.02	83.14	82.83
Energy, kcal/g		1.48-1.0	0.67	0.92	0.93

¹Osthoff *et al.*, 2017.

²Petzinger *et al.*, 2013. Early to late lactation range.

³50% evaporated milk, 50% boiled water by weight, PolyVisol Multivitamin drops plus iron, 0.79 g/1000 g formula, Lacteeze, 0.89 g/1000 g formula.

⁴Fort Worth Zoo: 5.5% Zoologic Milk Matrix 30/52, 44.5% evaporated milk, 50% boiled water, Colief 0.3 g/1000 g formula.

⁵Fresno Chaffee Zoo: 5% Zoologic Milk Matrix 30/52, 95% Lactaid, 5 g Probios Multispecies

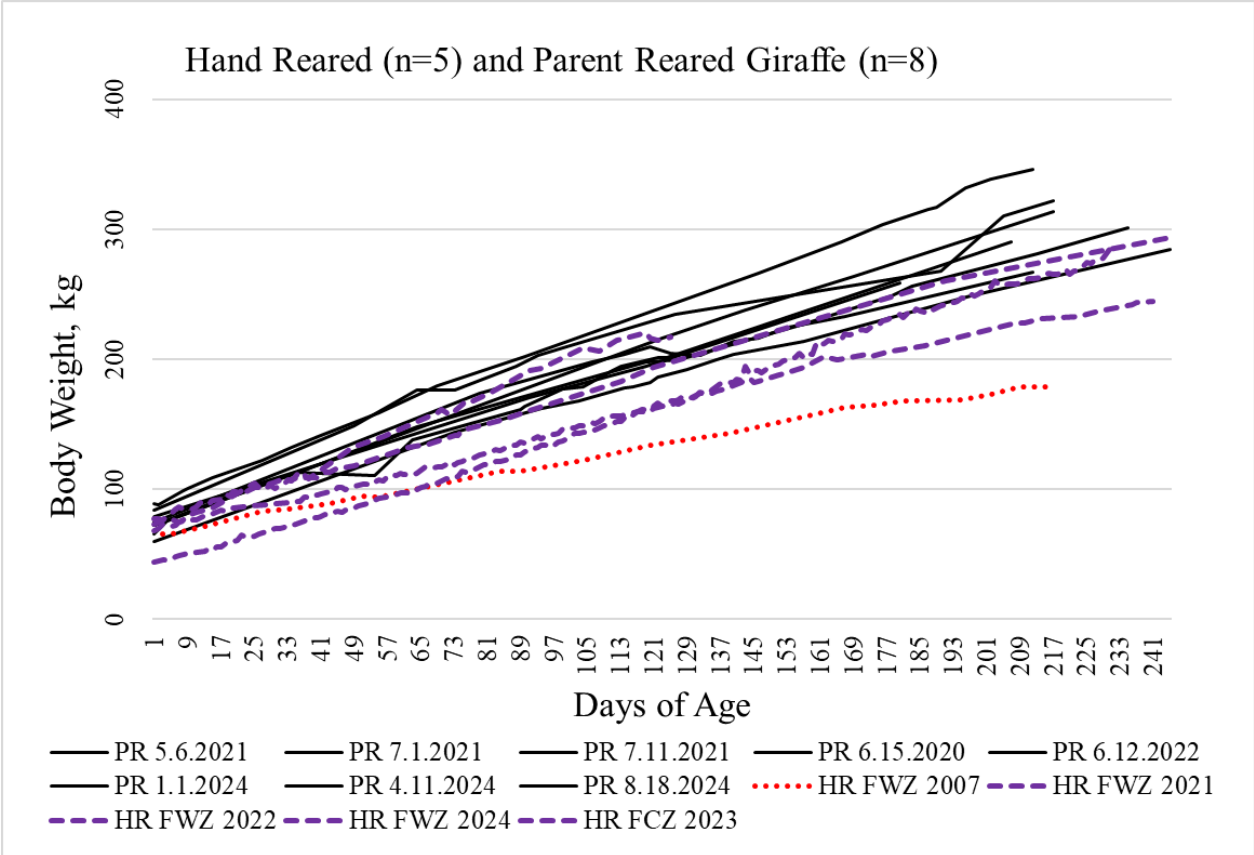


Figure 1. Growth of parent-reared (PR) reticulated giraffe (*Giraffa camelopardalis reticulata*; n=8) and hand-reared (HR) giraffe (*Giraffa camelopardalis reticulata*; n=4; *Giraffa camelopardalis tippelskirchi*; n=1).