

SICHUAN TAKIN (*BUDORCAS TAXICOLOR*) HAND REARING AT CINCINNATI ZOO & BOTANICAL GARDEN

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Abstract

Cincinnati Zoo & Botanical Garden had the opportunity to hand-rear two Sichuan takin (*Budorcas taxicolor*) calves. The first takin was born in 1997, while the second was born in 2015. The calves were from two different dams. In 1997, the calf was successfully reared using a formula of canned Meyenberg™ evaporated goat milk and water. The 2015 calf was raised on a fortified formula of powdered Meyenberg™ goat milk and water to meet his energy requirements without increasing the volume of formula fed. In both cases, the hand-rearing process was successful.

Introduction

In 1997, a takin calf was hand-reared due to the death of the dam during parturition. The 2015 calf was hand-reared due to maternal neglect and aggression from the dam. This was her first calf and maternal neglect is not an uncommon occurrence. She did successfully raise her second calf in 2017. The base of the formula chosen in both cases was goat milk based on takin being taxonomically classified in the family Caprinae. The products used were human grade.

Materials & Methods

The 1997 takin formula was canned Meyenberg™ goat evaporated milk and water as outlined in Table 1. The table shows three formulas used before the final concentration of 67% canned Meyenberg™ goat evaporated milk and 33% water was settled upon. This formula was able to maintain a healthy growth rate for the calf until he was weaned. In 2015, the first formula offered was canned Meyenberg™ evaporated goat milk to water at a ratio of 67:33 as outlined in table 2. However, at 19 days of age, the formula was changed from a canned evaporated product to a powdered product to provide more calories with less volume. The final formula was 18.9% powdered whole goat milk to 81.1% water. All Meyenberg™ products were purchased from a local grocer.

Results & Discussion

In 2015 when presented with a takin for hand-rearing, the first formula offered was a formula that had proven to be successful with a previous calf in 1997 consisting of 67% canned Meyenberg™ evaporated goat milk and 33% water. However, at 19 days of age, he was being offered the maximum volume of this formula based on his stomach capacity, yet his growth rate began to decline. To meet his nutritional requirements, it was necessary to offer a formula that could provide more calories with less total volume. It was determined that a new formula consisting of a more calorically dense product was needed. The canned evaporated goat milk and liquid whole goat milk were discontinued, and powdered goat milk was initiated. The new formula was developed based on the general assumption that a growth rate between 10%-15% of body mass per day is warranted for mammals. The second requirement for the formula was to provide the appropriate calories within a total volume that did not exceed the estimated stomach capacity of 3-5% of body mass. An energy calculation was used to determine the calories needed to meet the metabolic

energy requirements (MER) for the growing calf ($MER(kcal) = 4[1.5(68 * \text{Body Mass}(kg)^{0.75})]$). The energy equation used is based on the MER of non-ruminant mammals. This seemed appropriate because at this point in the calf's development, the rumen is not performing the function of fermentation and acts more like a non-ruminant, simple stomach. The calculated calorie requirement based on that energy equation lead to the development of the formula concentration made on day 19. Table 3 provides the energy of the four formulas used in both years. The canned evaporated milk and water combinations were 0.49 and 0.65 kcals per gram while the fortified/powdered formulas were 0.76 and 0.95 kcals per gram. One other formula change was required, to again meet energy demands, on day 39. This fortified diet consisting of 18.9% powdered goat milk and 81.1% water was the final diet that proved successful to meet continued energy needs and sustain an appropriate growth rate. At day 96, the formula density was reduced to 15% powdered goat milk and 85% water due to beginning the weaning process and the introduction of solids.

The computerized analysis of the formulas used both times a takin calf was hand-reared shows the large difference in the evaporated goat milk formula versus the fortified powdered goat milk formulas. Both evaporated goat milks used contained 9.05% fat and 9.07% protein. The powdered goat milk formulas contained 26.2% fat and 29.3% protein in the first formula versus 26.2% fat and 29.2% protein in the second formula. Figure 1 outlines the growth of each calf in the first 30 days. The growth rate for both calves was a steady incline.

Table 1. 1997 Takin calf formulas outlined.

Day	Date	Formula
1	6/24	100% frozen cow colostrum
2	6/25	20% frozen cow colostrum/40% goat milk ¹ /40% water
3	6/26	50% goat milk ¹ /50% water + 10% colostrum-guard® by volume
5	6/28	60% goat milk ¹ /40% water + 10% colostrum-guard® by volume
7	6/30	50% goat milk ¹ /50% water + 10% colostrum-guard® by volume
20	7/13	60% goat milk ¹ /40% water + 10% colostrum-guard® by volume
21	7/14	67% goat milk ¹ /33% water + 10% colostrum-guard® by volume

¹Goat milk - Meyenberg™ evaporated goat milk canned (Turlock, CA)

Table 2. 2015 Takin calf formulas outlined.

Day	Date	Formula
1	6/26	100% LAND O LAKES® Bovine IgG ¹ mixed
3	6/28	20% bovine IgG ¹
4	6/29	67% goat milk ² /33% water
7	7/2	50% goat milk ² /25% water/25% whole goat milk ³
11	7/6	50% goat milk ² /25% water/25% whole goat milk ³
15	7/10	16.75% goat milk ² /8.25% water/75% whole goat milk ³
19	7/14	15% goat milk powdered ⁴ /85% water
39	8/3	18.9% goat milk powdered ⁴ /81.1% water
96	9/16	15% goat milk powdered ⁴ /85% water

¹LAND O LAKES® Bovine IgG (Purina Animal Nutrition LLC, St Louis, MO)

²Goat milk - Meyenberg™ evaporated goat milk liquid.

³Whole goat milk - Meyenberg™ whole goat fresh milk.

⁴Powdered goat milk - Meyenberg™ whole goat milk powdered.

Table 3. Nutrient comparison of hand rearing takin formulas using Zootrition™.

Nutrient Parameters	As-fed	% Solids		% Solids (DM)		
	kcal/gram	DM	Fat	Protein	CHO	Ash
50% goat milk ¹ /50% water	0.49	11.05	9.05	9.05	13.57	0.45
67% goat milk ¹ /33% water	0.65	14.77	9.07	9.07	13.61	0.22
15% goat milk ² /85% water	0.76	14.34	26.16	29.30	40.81	0.59
18.9% goat milk ² /81.1% water	0.95	18.04	26.20	29.34	40.87	0.45

¹Goat milk - Meyenberg™ evaporated goat milk canned.

²Goat milk - Meyenberg™ whole goat milk powder.

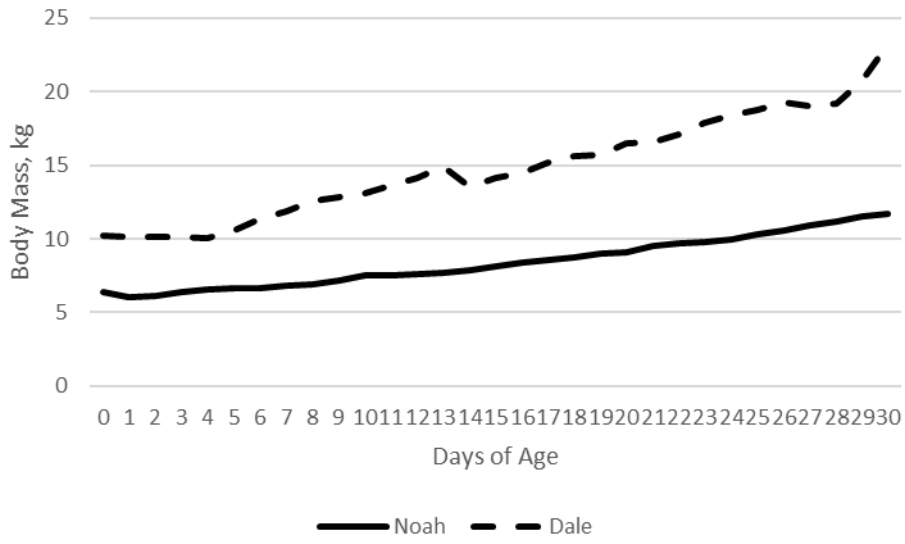


Figure 1. Body mass of two hand reared takin calves in the first 30 days of age.