

Lecicarbon, Athenstaedt & Redeker, Bremen, Germany.
 Librium, Deutsche Hoffmann-La Roche AG, Grenzach/Baden, Germany.
 Luizym, Luitpold-Werke, Munich, Germany.
 Protovita (multi-vitamin preparation), Deutsche Hoffmann-La Roche AG, Grenzach/Baden, Germany.
 Humatin (Paromomycin Parke-Davis) Munich, Germany.

HAND-REARING A
 BLACK RHINOCEROS

Diceros bicornis

AT DETROIT ZOO

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ON 1 November 1964 a female calf was born to the pair of Black rhinoceroses, *Diceros bicornis*, at Detroit Zoo. All went well until the ninth day after the birth when signs of a uterine prolapse appeared in the mother.

Before she could be treated the uterus retracted of its own accord and it was decided to await further developments. The following day, 11 November, the complete uterus emerged. The flapping of the uterus against the animal's hindlegs so excited her that she kicked and injured the tissues, causing extensive bleeding and before we were able to sedate her, she died from shock. Post-mortem examination revealed that the probable cause of the prolapse of the uterus was a puncture that had been made in the uterus as the consequence of the birth of her previous calf.

It was decided to hand-rear the calf. We decided to base the milk substitute on the analysis of the milk of the Black rhinoceros published in Volume 2 of the *Yearbook* (Greed, 1961). SMA, S-26, a standard milk formula for human infants (Wyeth Laboratories, Inc, Philadelphia, USA) proved to be very close in basic analysis to the analysis of Black rhino milk made at Bristol. The approximate analysis of SMA, S-26 is given in *Table 1*.

Table 1. Composition of one 13 fl oz can of SMA, S-26, a milk substitute produced for human infants (Wyeth Laboratories, Inc, Philadelphia, USA) and used as a milk-substitute for a hand-reared Black rhinoceros calf, *Diceros bicornis*, at Detroit Zoo.

Undiluted 13 fl oz per can			
Fat	7.2	Calcium	0.804
Carbohydrate	14.4	Phosphorus	0.066
Protein		Iron	0.001
60 per cent Lactalbumin	3.1	Copper	0.00008
Whey Protein	1.8	Calories per fl oz	40
40 per cent Casein	1.3	Total solids	25.2
Ash	0.51		
Vitamins in Dilution 1 part milk and 1 part water			
Each quart contains:			
Vitamin A		2500 USP units	
Vitamin D		400 USP units	
Vitamin E		6 IU	
Vitamin B ₁ (Thiamine hydrochloride)		0.67 mg	
Vitamin B ₂ (Riboflavin)		1.00 mg	
Vitamin C (Ascorbic acid)		50.00 mg	
Vitamin B ₆ (Pyridoxine hydrochloride)		0.4 mg	
Vitamin B ₁₂		1 mcg	
Vitamin N (Niacinamide)		5 mg	

In addition to SMA, S-26, the rhino calf also received daily 1 oz of Zima Elixir (containing iron and Vitamin B complex) and 1 oz of Vi Sorbin (Vitamin B complex and minerals). These were added to the milk substitute.

The calf was fed from a two-quart plastic bottle with a calf nursing nipple, about 1 in. wide and 3 in. long. When first orphaned it was fed 20 oz of the milk substitute five times a day. After one month, human infant cereal was added to the milk substitute, starting at one tablespoon and gradually increasing to one cup per 40 oz of the milk substitute by the middle of February when the calf was approximately three months old. By the beginning of January the calf was receiving 48 oz of milk substitute every eight hours.

From the middle of February, concentrated attempts were made to try and get the calf to take solid foods but they all proved unsuccessful. Up to 2 lb of mashed potatoes, cooked rice, bananas and cream of wheat were all added to the milk substitute on different days. The only solids the calf showed any interest in eating were its own and its father's faeces.

At birth the calf was estimated to weigh 70 lb. On 11 November, at the age of 11 days, it weighed 107 lb and on 16 December 116 lb. At the age of four months the calf died. It weighed 123 lb at death. During the four months of artificial feeding it had gained less than 20 lb, not much more than was gained during the first 10 days with its mother. Early faecal examination revealed that a small amount of blood was getting into the digestive tract. Post-mortem examination showed the cause of death to be severe haemorrhaging in the stomach due to extensive ulceration and enteritis along the greater part of the small intestine. It is thought that the stomach may have been ulcerated from birth or shortly afterwards.

If we had occasion to hand-rear another rhinoceros calf we would give it another animal, such as a goat or a sheep, as a companion. The example of another animal eating solids might well encourage it to do likewise.

REFERENCE

GREED, R. E. (1961): The composition of the milk of the black rhinoceros. *Int. Zoo Yearb.*, 2: 106.

CARE AND NUTRITION OF MOOSE

Alces alces americana
IN CAPTIVITY

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IN his book *North American Moose*, Dr Randolph L. Peterson (1955) says that 'from the beginning of the white man's explorations and settlement of North America, the majestic moose has been a familiar figure in the northern wooded part of the continent. Such a conspicuous animal could hardly fail to impress the pioneers and consequently it has been mentioned in the records of many of the early writers. Notable among these are the writings of the Jesuit missionaries of the seventeenth century. Figuring prominently as a source of food, clothing and many other necessities, as well as being an object of sport and recreation, the moose has been the subject of innumerable accounts in the subsequent pages of literature.'

Paradoxically, this largest and most powerful member of the deer family is difficult to keep in captivity and this poses a challenge to any zoo.

Since 1951 we have had experience looking after both the American moose, *Alces alces americana*, and the Alaskan moose, *Alces alces gigas*. It cannot be said whether our success has been due to the constitution of the individual animals, the quarters we have provided for them, the diet we feed them, or a combination of all these factors.

Our first pair of American moose came to the old Milwaukee Zoo at Washington Park from the Kenora district, Ontario, Canada, in September 1951. Since then, 25 American moose calves have been born, at the old Washington Park Zoo and at the new Milwaukee County Zoo. Of these, some died, others were sold and four remain in the