

MILK COMPOSITION OF THE SUMATRAN RHINOCEROS
(Dicerorhinus sumatrensis sumatrensis)

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Abstract

Knowledge of the milk composition of the Sumatran rhinoceros will be an essential part of the captive-breeding programme if hand-rearing or nutritional supplementation becomes necessary. As with the other rhinoceros species, the chances of acquiring rejected calves are unavoidable. Similarly, in countries of origin, the potential of finding strayed or orphaned Sumatran rhinoceros calves are inevitable. Based on milk samples collected from a single lactating female, the major composition of Sumatran rhinoceros milk at 3 days lactation consists of 11.24% total solids, 0.99% fat, 4.17% protein, 5.38% lactose and 10.27% non-fat-solids. The fat and protein content were reduced markedly to 0.07% and 1.37%, respectively at 2 years lactation. This information provides a basis for formulating milk substitute to feed any hand-reared Sumatran rhinoceros calves.

Abstrak

Pengetahuan kandungan susu Badak Sumatera adalah penting keatas program pembiakan didalam kurungan jika pembelaan anak badak atau pertambahan makanan diperlukan. Seperti dengan spesies badak-badak lain, peluang untuk menerima anak badak sumbu yang ditinggalkan ibu adalah tidak dapat dielakkan. Di Semenanjung Malaysia juga peluang mendapat anak badak yang kehilangan ibu juga tidak dapat dielakkan. Berasaskan sampel susu yang diambil dari seekor Badak Sumatera, komposisi susu pada hari ketiga, mengandungi 11.24% total solids, 0.99% lemak, 4.17% protin, 5.38% laktos dan 10.27% non-fat solids. Kandungan lemak menurun kepada 0.07% dan protin kepada 1.37% pada dua tahun masa penyusuan. Maklumat ini akan menjadi asas bagi menyediakan susu gantian untuk menyusu anak Badak Sumatera yang ditinggalkan ibu.

Introduction

Currently, there is no information on the milk composition of the Sumatran rhinoceros, which is essential as a guideline for the hand rearing of the Sumatran rhinoceros calves in the future. With the increase in habitat destruction, the chances of acquiring young Sumatran rhinos also increases. In a number of incidences in Malaysia and Indonesia, adult females were poached within or in

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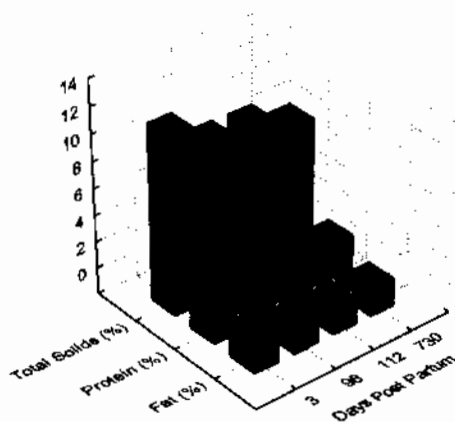
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adjacent areas of deforestation. Orphaned Sumatran rhino calves, as young as 3 to 6 months of age were found in bad condition and severely dehydrated. In hand-raising rhino calves, the use of accurate milk formulation is important for ensuring adequate nutrition throughout the growth period prior to weaning. This paper reports the milk composition at various times of lactation of a female Sumatran rhino that gave birth and successfully raised the calf in captivity at Zoo Melaka in 1987.

Materials And Methods

Milk composition varied during each collection. During the entire lactation period, fat, protein and lactose ranged from 0.07 - 0.99%, 1.37 - 4.17% and 5.38 - 6.68%, respectively. The total solids, fat and protein declined markedly throughout the lactation period (Fig. 1). The total solids constituent decreased by 26.25% between the first (3 days) and last (2 years) collections. Fat composition decreased from 0.99% at 3 days lactation to 0.007% at 2 years. Similarly, protein content was 4.17% at 3 days lactation, 2.07% at 14 weeks, 1.7% at 16 weeks and 1.37% at 2 years. The solids-non-fat percentage decreased from 10.27% to 9.06% and 9.09% at 14 and 16 weeks respectively before declining to 8.20% at 2 years. Lactose increased steadily

Fig. 1: Total Solids, Fat and Protein in Sumatran Rhinoceros Milk



from 5.38% (3 days) to 6.68% at 16 weeks before reducing to 6.19% at 2 years. The pH ranged from 6.14 at 3 days to 7.05 at 2 years.

Discussion

Previous reports have indicated that hand raising rhinoceros calves requires a good understanding of post-natal nutrition. As an example, a Black rhinoceros calf at the Detroit Zoo which was fed SMA, S-26 milk (Wyeth Laboratory, Inc. Philadelphia, USA) containing 7.2% fat, 6.2% protein and 14.4% carbohydrate gained only 20 pounds and died at 4 months of age (Kreag, 1966). This age represents a stage where the calf is still very dependent on the mother's milk. In the Black rhinoceros, the fat composition in the milk was 0.45% throughout lactation with protein and lactose ranging from 1 - 1.65% and 6.1 - 6.9% respectively (Gregory et al, 1965). The marked differences in composition between natural milk and the artificial milk substitute could adversely effect the animal's health.

At Hamburg Zoo, hand rearing of an Indian rhino calf was successful although problems associated with severe diarrhoea, constipation and flatulence were observed as early as 11 days after feeding a milk substitute containing 5% fat. During the first 24 days on this "top quality" substitute milk, the bodyweight decreased by 2 kg. (Hagenbeck, 1966). Another Indian rhino calf was hand - reared from 3 days of age and fed with a commercial milk from tuberculin-tested disease free cows containing 3.1% fat, 3.3% protein and 4.7% lactose. This milk was pasteurised, cooled and sealed, providing a germ - free nutrition to the rhino calf. In the Indian rhinoceros, the fat composition of milk at 40 and 50 days post-partum is 4% and 3.5% respectively while lactose ranges from 4.4% to 8.3%. Total Nitrogen (mg/dl) at 10 days, 40 days and 50 days post partum are 190.4, 207.2 and 182.0 (Lang, 1961).

Although calf survived, similar problems associated with severe diarrhoea and constipation were observed during the period (Hagenbeck, 1969). A 21 day old female White rhinoceros calf was successfully raised on a low fat diet made up of 227 gm of skim milk powder, 227 gm of calf milk replacer, 20 mls of a vitamin - mineral enriched skim milk and 2.25 L of water (Wallach, 1969).

The death of an orphaned Sumatran rhinoceros calf in 1984 was partly attributed to an incorrect milk substitute (Dutch Lady, Malaysia) consisting of 3.5% fat, 3.4% protein and 4.7% lactose and a concurrent pulmonary congestion with suppurative pleuritis. It was only 3 years later that we had the opportunity to study milk composition in the Sumatran rhinoceros female that gave birth and successfully raised a calf. The daily weight gain of the Sumatran rhino calf was 860 gm during the first year on natural milk (Zainal-Zahari, 1990).

This study revealed similarities and differences among several rhinoceros species. The fat composition in the Sumatran rhinoceros at 3 days lactation was comparable to the Black and White rhinoceros, although in the White, the value is 0.3% lower (Greed, 1960; Jones, 1978). Similarly, some authors described milk fat composition in the Indian and Black as traces or negligible (Aschaffenburg, 1961; Fowler, 1986). In the Sumatran rhinoceros, fat constituent declined steadily from 0.99% at 3 days to 0.42% and 0.07% at 98 days and 730 days lactation respectively. How-

ever, in the Indian rhinoceros, fat composition were 4.0% and 3.5% at 40 and 50 days lactation respectively (Lang, 1961). In the White rhinoceros, fat composition increased by 300% at 56 days lactation (Jones, 1978). In the Sumatran rhinoceros, the total solids and protein composition declined markedly at 14 weeks, 16 weeks and 2 years lactation.

Based on constituent differences, cows' milk and recently available milk formulae (Nespray, Nestle, Denmark; Fernleaf, New Zealand Dairy Board, New Zealand; Lactogen, Nestle, Malaysia) are therefore unlikely to substitute adequately for the Sumatran rhinoceros. However, Kerrygold (Republic of Ireland), Weight Care (F & N, Malaysia), Graduate (F & N, Malaysia) and Bunlac (Bun Guan Bros Sdn. Bhd, Malaysia) brands contains very low levels of milk fat ranging from 0.7% to 1.0%. With protein and lactose ranging from 36% - 38% and 50% to 51%, respectively. Therefore, it is possible to correct the formulation of milk fat, milk protein and lactose at different stages of lactation to ensure a more accurate nutrient intake for the growing calf. In the White rhinoceros, a successful milk substitute consisted of a 50% low fat cow's milk and 50% non-fat cow's milk, 30ml/L corn syrup and soluble vitamin powder. This formulation will provide a milk substitute containing 1.0% fat, 3.6% protein and 3.5% lactose (Fowler, 1986). In the Sumatran rhino calf, suckling was still observed at 2 years of age. Although the dam continued lactating normally, the major milk composition decreased very markedly with an increase in water content, indicating a decreased reliance on milk. At this age the calf was consuming a similar diet to the adult.

Conclusion

Knowledge of the composition of the milk in rhinoceros, as in other wild species, is essential for proper hand rearing of calves. Not only does the composition change over time, it appears to vary between species. The data presented here should assist future circumstances when hand rearing Sumatran rhinoceros calves is necessitated.

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