

Colic, abscesses, eye infections, foot infections

See *Care of the White Rhinoceros in Captivity* (this Section).

Do not

- Do not put animals, other than cow and calf, together in the same enclosure. Even in the case of a cow and a calf, the individuals must be separated initially until they have calmed down.

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Hand-raising of orphaned rhinoceros calves

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1 Introduction	562
2 Milk substitutes	563
3 Feeding	564
4 General principles	564
5 Colostrum	565
6 Case studies	565
6.1 White rhino	565
6.2 Black rhino	567
7 References	569

1 Introduction

Both the black and the white rhinoceros are extremely valuable animals, and it is essential that there should be some information available on how to raise calves that have been separated from their mothers. In the case of the black rhino, being an animal that is threatened with extinction, this information becomes even more critical. There is very little published data on the raising of rhino calves, and that which is available is sketchy and difficult to obtain. While there is still insufficient information available to make firm recommendations and predict results, it is essential that there be some review of current knowledge on this subject. Given the limitations already mentioned, I have summarized the important points into a set of general guidelines based on what information I could obtain and on personal experience in assisting with the raising five white rhino orphans. This is followed by two recent case studies that highlight some of the problems that may be associated with the difficult but rewarding task of raising rhino calves.

Rhino calves...

- Do not drink water, even if it is freely available. (It should, nevertheless, be available.) This seems to be the case while the calf is being fed milk at 10–15% of its body mass. As soon as it starts taking significant amounts of solids and the milk to body mass ratio declines, it will start taking water.

- Become stressed if they are continually exposed to strange faces.
- Do not require manual stimulation in order to urinate and defaecate.
- Become attached to their foster mothers, and adapt with great difficulty to changes in the person caring for them.
- Are unable to control their body temperature for the first six weeks of life. Rectal temperature may vary from 29.4°C (!) to 39.7°C. Body temperature appears to become more constant between six and fourteen weeks, and thereafter stabilizes at approximately 37.5°C (Trendler, pers. comm.).
- Obtain colostrum from their dams. However, there may also be transfer of antibodies before birth: there has been at least one case of a calf being raised successfully without having received colostrum or colostrum substitutes¹.
- Must be exercised regularly from an early age.
- Tend to 'flop down' and sleep after each feed.
- May occasionally develop a serous nasal discharge (runny nose), but this usually passes uneventfully.
- Have a respiratory rate of 16 to 30 breaths/minute. This increases with fever or pain, and decreases as the calf gets older.
- Become dehydrated and hypoglycaemic very quickly when they are young. Calves in this state must be warmed and given an intravenous infusion containing 5% dextrose (or Lactade[®] *per os* if they can still suckle).
- Are born without any teeth. Reports on tooth eruption are varied: 3 weeks (black rhino), 56 days (black rhino), 70 days (white rhino). The eruption of the teeth is usually accompanied by a rise in temperature, sore or itchy gums, and possibly even a loss of appetite and diarrhoea.
- Should be weaned at 18 months of age. They can be weaned as early as 12 months, but it is preferable to wean them later.
- Thrive on the company of other animals and humans.
- Take a variable time to start eating solids: two months (black rhino), four months (white rhino), seven months (white rhino).
- That are orphaned at five months are already eating solids well, although they still need milk. Calves that are orphaned at a young age may only take solids after 6–7 months.

2 Milk substitutes

- Rhino milk is unusual in that it contains very little fat and a high proportion of lactose (see Table 1).
- Many preparations have been used as a base for a milk substitute for rhino calves: Denkavit[®] calf milk replacer (Flamand, pers. comm.), Elite[®] skimmed milk powder followed by Surromel[®] (Bengis, Espie, Keet, pers. comm.), Lactogen[®]^{1,2}, Melk-Vita[®] calf milk replacer (author), fresh skimmed milk, Nestle Rhino Milk[®] (Trendler, pers. comm.).
- These standard milk formulas should be modified to resemble rhino milk as closely as possible, especially with respect to fat and lactose. Melk-Vita[®], Surromel[®], Denkavit[®], and Elite[®] formulas should be prepared according to the instructions and then substituted with 40 g of glucose per litre. Even though the fat content of the calf milk replacers is reasonably high, they appear to be well tolerated. A substitute based on Lactogen[®] has been described by Sheldrick².

Table 1. Percentage composition of rhinoceros milk.

Component	White rhinoceros*		Black rhinoceros**
	Sample A	Sample B	
Total solids	8,84	8,26	8,10
Fat	0,6	Trace	Trace
Lactose	6,50	6,85	6,06
Protein	1,54	1,18	1,54
Ash	0,20	0,23	0,34
pH	-	6,4	-

* Data from Wallach, 1969 (Ref. 1). Sample A is from a cow with a five month old calf; sample B is from a cow with an eighteen month old calf.

** Data from Aschaffenberg et al., 1961 (Ref. 2). The sample was taken from a cow with a nineteen month old calf that was still suckling.

- Nestle Rhino Milk® closely resembles rhino milk, and is probably the best substitute to use. However, this milk was only developed in 1992, and may not be available to people in the field at short notice. In these cases any of the other options mentioned, suitably modified, should be adequate.
- On a milk substitute based on Melk-Vita® the dung of young rhinos is of a clay to cow pat consistency. This may be due to the relatively high fat content and brown sugar supplement. It is probably advisable to use glucose instead of sugar. As in the case of foals, rhino calves, especially young ones, may be unable to digest sucrose properly. As the intake of solids increases, the dung begins to resemble that of an adult rhino.
- Additional energy is required by the rhino calf as it gets older. This is best provided by adding a few teaspoons of cereal (e.g., Nestum®, Pronutro®) to the milk at some or all of the feeds (see the case studies below).

3 Feeding

- Milk should be fed at 10–15% of body weight. Overfeeding must be avoided as it leads to diarrhoea.
- Milk must always be fed at the same temperature, preferably body temperature.
- Rhino calves are usually presented when they have already fed from their mother, and may even be taking some solids. These calves are usually very wild and aggressive, but settle down within a day or two. It is not too difficult to get them to feed – simply put the milk in a baby bath and leave it in the pen. The calf will usually drink within a couple of hours. Unused milk must be removed before it goes off.
- Black rhino calves should be offered good quality lucerne and fresh browse; white rhino calves should be offered good quality teff with at most 10% lucerne added. Horse cubes should only be offered once the calf has adapted to its hay diet.

4 General principles

- The same person should care for and feed the calf until weaning.
- Diarrhoea must be treated by withdrawing the milk and replacing it with an electrolyte solution (e.g., Lactade®). The milk must be re-introduced gradually. Persistent or severe diarrhoea may require antibiotic therapy.

- Strict hygiene must be observed with respect to both feeding and accommodation. Feeding utensils should be sterilized by boiling or in a suitable preparation (e.g., Milton's®).
- It is essential to provide adequate shelter from temperature extremes, rain, and wind.
- A mud wallow must be provided right from the start. Apart from the cooling effect, the mud seems to stop the skin cracking and also takes off old skin. It also provides protection from sun and flies.
- Attention must be paid to the need of rhino calves for company. This is essential to the survival of the calf. If sufficient attention cannot be provided, a companion (goat kid, lamb, or even another a rhino) should be obtained. The companion may also be of great help in getting the calf to take solids.

5 Colostrum

If a rhino calf has not received colostrum, there are several alternatives.

- 1 Give one litre of bovine colostrum – preferably within six hours of birth but definitely within the first 24 hours. Do not give more than 300 ml at a time. The efficacy of this method has not been ascertained: it does not work in foals.
- 2 Give one litre of rhino plasma slowly IV. A short-acting cortisone preparation (e.g., Solu Delta Cortef®) should be given at the same time to prevent anaphylactic shock. This procedure is successful in foals but has not been tried in rhinos as far as I am aware. This option, and option 1 above, are obviously not practical in most cases.
- 3 Give one litre of rhino plasma orally. The problem with this alternative is that there are special cells in the wall of the gut that absorb antibodies. These cells can only absorb a limited amount of protein before they become inactive. The other proteins in the plasma therefore limit the number of antibodies (which are also proteins) that can be absorbed by the oral route. Oral administration could be combined with the IV alternative discussed above.
- 4 There will soon be a synthetic foal colostrum available that apparently works very well in horses. This may be useful in rhinos. An inter-species colostrum will soon be available that may also be effective.
- 5 Do nothing. There has been at least one case of a rhino calf being raised successfully without any colostrum or colostrum replacement, as mentioned above.

6 Case studies

6.1 White rhino

The white rhino calf *Lahliwe* ('the rejected one') was born in the bomas at Umfolozi Game Reserve in Natal on the 26th of March 1992. She was rejected by her mother immediately after birth and was severely stressed and had dilated pupils and haemorrhages in the anterior chambers of both eyes (as a result of being battered by her mother) when she was rescued. First-aid treatment consisted of Kortico® (2 ml IV) and Sulmethatrim® (3,5 ml IV for three days). Her umbilicus was cleaned with Provodine® antiseptic solution and sprayed with Airbiotic GV®. Her mass at this stage was 52 kg. Birth mass is variably documented as being approximately 40 kg⁵ and 55–65 kg⁶.

The Melk-Vita® mixture given above was used as a milk substitute. A calf teat and a one litre Coke® bottle were used. One hundred ml of rhino serum were added to her first feed. The total daily ration (5 l) was given over a 24 hour period at 1,5–2 hour intervals. Due to her initial concussion she was not taking in her full quota, and on the third day she began to lose her sucking reflex. She became lethargic and was apparently hypoglycaemic. An intravenous infusion of Plasmavet® (supplemented with 50% dextrose to make a 5% dextrose solution) was given overnight. By the next day she was much better, but again did not feed properly and the drip had to be repeated. The next day she was very strong, and from that day on she never looked back.

The first meconium was passed on the second day. It was very orange and hard. She appeared to be struggling to defaecate, and a Lenolax® enema was given. In retrospect this may not have been necessary. Meconium was passed for about three days.

She had a large area in which to wander, and got sufficient exercise. Her shelter was a small rhino crate: this was padded with teff that was cleaned out on a daily basis. A mud wallow was made for her which she utilized regularly.

The following is a summary of her progress.

Weeks 0–2. Milk: 4–6 l/day in 12 feeds. Mean defaecations 1,5/day, mean urinations 2,4/day.

Weeks 2–4. Milk: 6–9 l/day in 12–14 feeds. Mean defaecations 1,8/day, mean urinations 5,9/day.

Weeks 4–6. Milk: 10–14 l/day in 10 feeds. Mean defaecations 2,4/day, mean urinations 6,2/day.

Weeks 6–8. Milk: 15–18 l/day in 10 feeds. Mean defaecations 2,5/day, mean urinations 5,5/day.

Tried to get her to drink from a baby bath, but not easy.

Weeks 8–10. Milk: 18–20 l/day in 8 feeds. Mean defaecations 2,9/day, mean urinations 6,8/day.

Now a four-hour break in feeds at night.

Weeks 10–12. Milk: 13–20 l/day in 7 feeds. 1 tsp. Pronutro® at each feed. Mean defaecations 2,8/day, mean urinations 5,8/day.

Night feeds stopped, sleeping ±8 hours per night. Drinking almost all her milk from a baby bath. Stools became even softer than a cow pat, but did still have some form to them. This was not treated, but her milk was not increased during this period.

Weeks 12–14. Milk: 21–23 l/day in feeds. 2 tsp. Pronutro® at each feed. Mean defaecations 2,0/day, mean urinations 5,8/day.

Sleeping approximately 12 hours per night. Very seldom required a night feed.

Weeks 14–16. Milk: 23 l/day in 7, then 6, then 5 feeds. 3 tsp. Pronutro® at each feed. Mean defaecations 2,1/day, mean urinations 5,0/day.

No night feeds. Faeces again very soft, but no treatment was given. The milk was again not increased.

Weeks 16–18. Milk: 23 l/day in 5 feeds. 3 tsp. Pronutro® at each feed. Mean defaecations 1,9/day, mean urinations 4,2/day.

Glucose was gradually replaced with brown sugar. In retrospect this may not have been the right thing to do, although it has been the practice in the past. Brown sugar may predispose rhino calves to diarrhoea because of the molasses content and a possible inability to digest sucrose completely, as mentioned above.

Weeks 18–20. Milk: 25 l/day in 5 feeds. 5 tsp. Pronutro® at each feed. Urination and defaecation records incomplete after her foster mother departed.

- At all stages she did not like being fed by strangers, and adapted with great difficulty to a new handler.
- A goat was acquired to keep her company. They became good friends, and he got her interested in solid food. He even went with her to her new home.
- After 20 weeks the amount of milk was kept constant but the Pronutro® was increased up to 15 tsp. per feed by the time she left at the age of six-and-a-half months.
- Until the age of five-and-a-half months she had almost invariably left some or all of at least one feed. Thereafter she drank everything. At this stage she started taking in some solids, but her intake only became significant at about seven months.
- The other four calves that I have helped to raise did well on Melk-Vita®, brown sugar, and Pronutro® (one heaped cup/5 l), as has a very young (±2 months old) black rhino, on Denkavit®, brown sugar, and Pronutro® (Flamand, pers. comm.). As mentioned above, the brown sugar should preferably be replaced with glucose. Occasional bouts of diarrhoea were remedied by replacing the milk completely with Lactade®. Milk was gradually re-introduced after a day or two, depending on the severity of the diarrhoea.

6.2 Black rhino

The black rhino calf *Bwana Tshiwana* ('Mr Orphan') was born prematurely on the 11th of July 1992 and was raised by Karen Trendler of The Animal Rehabilitation Centre outside Pretoria. The calf was found when he was approximately 12 hours old. He weighed 21 kg (10–15 kg less than a full-term calf²), and had probably not had any colostrum. He was dehydrated, weak, chilled, and distressed, and had a torn umbilicus. He was immediately put onto a heating pad and given Lactade® (he still had a strong sucking reflex). He was also given one litre of bovine colostrum within 12 hours (the Lactade® and colostrum were alternated every hour). Karen Trendler believes that this may have stimulated the passing of meconium, but may also have led to the complications experienced later. The young calf was very receptive to company.

A large plug of meconium (dry, very orange, like a cluster of small stones, and with a sweetish odour) was passed on the second day. He had not yet urinated, despite stimulation. His temperature ranged between 34,9 and 35,6°C, and he shivered a lot. His pulse was erratic (80–112) and his respiration ranged from 40–52 breaths/minute.

His initial formula consisted of fresh skimmed milk, glucose, Aminostress® and Biorem®. This was fed at 15% of body weight. He was kept indoors under strictly hygienic conditions. Temperature was controlled and no visitors were allowed.

Days 3–4

He urinated for the first time on the third day, when he also passed a hard stool. His umbilicus became swollen and started to bleed. It was tied off and dressed. He was given 200 ml of milk every two hours around the clock. Later this was increased to 250 ml. He was taken for short walks outdoors. Towards the end of this period he passed a reddish-brown, shiny stool.

Days 5–6

His temperature ranged from 35.6–37.6°C, pulse rate from 72–84, and respiration from 21–26. On the sixth day his temperature went up to 38°C, and he developed diarrhoea six hours later. The milk was replaced with Lectade[®] for 24 hours; thereafter he was put gradually back onto milk. He was visibly very ill during the bout of diarrhoea.

Days 8–9

Another severe bout of diarrhoea developed – it was very foul smelling. Lectade[®] was given – 100 ml every half hour. He was desperate for physical contact. The milk was changed to Lactogen[®] 2. Biorem[®] was added but not glucose. There was a gradual improvement, but his stools remained soft and a pale grey, shiny colour. Intervals between stools were relatively constant.

After Day 10

He was not really satisfied by his formula. Over four days he was put on to a special rhino milk formula developed by Nestlé. The results were excellent – well-formed, dark green stools every 3 days. There was no foul smell, less wind, and no diarrhoea or constipation on this diet. He was still being fed every two hours.

At three-and-a-half weeks he developed polyarthritis, possibly as a result of an infected umbilicus. Symptoms included stiffness and pain. His left foreleg became very swollen and inflamed. Initially there was no increase in rectal temperature, but it rose by 2–3°C a day later. Polyarthritis was confirmed on X-ray examination. He was confined indoors on thick foam-rubber mattresses and given Clamoxyl[®] palatable drops for two days. This was followed by amikacin which was injected IM twice daily for seven days. He was very distressed during this period, but continued to drink willingly. The Clamoxyl[®] caused a mild diarrhoea, and the urine became cloudy and had a distinct Clamoxyl[®] smell. The amikacin was followed by another three days of Clamoxyl[®]. The swelling and inflammation was down and the rectal temperature back to normal after five days.

His joints were strapped for support and he was given physiotherapy. He was put on an extended course of Purbac[®] for six weeks and was on infra-red lamp therapy for five days. He was gradually re-introduced to exercise and was moved outdoors into a small pen for short periods to expose him to some sunlight and fresh air. He had recovered fully by 11 weeks.

- At four weeks the feeding schedule was changed to 3-hourly, still at 15% of body weight. At 17 weeks he was fed four-hourly and slept seven-and-a-half hours a night.
- Initially a normal baby bottle was used. This was later replaced by a 1.5 litre Coke[®] bottle with a calf teat which was the perfect size. The hole was later enlarged.
- From eight weeks Nestum[®] cereal (No. 5) was added to every second feed as it was felt that the volume of fluid was too much for comfort. (I feel that this is a valid measure to sustain weight gain and ensure satisfaction.)
- At 17 weeks (i.e., at the time of writing) he became interested in solid food but was not successful in his attempts at browsing.
- His first teeth began to erupt at eight weeks. This was accompanied by the problems mentioned at the beginning of this paper. At 10 weeks he had two teeth, at 11 weeks he had four, and at twelve weeks he had six.
- His skin was very soft and sensitive, and became very dry. It was cleaned and moisturized using Elizabeth Anne's Baby Shampoo[®]. His skin peeled dramatically at 3–4 weeks

of age – this may have been due to his prematurity or to the dehydration. He was given regular mud baths and kept fairly free of ticks, although the odd one was left alone to allow the development of immunity.

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