

An introduction to feeding and management of snow leopard in Xining Zoo, China

Full Text:

The snow leopard is a typical mountain animal and a precious fur-bearing species. Since the 1960s the snow leopard has been reared and exhibited in the Xining Zoo where it is always enjoyed by visitors as a kind of rare and highly valued animal.

SUMMARY OF GEOGRAPHICAL DISTRIBUTION

Qinghai Province lies on the Qinghai-Xizang (Tibet) plateau and is two-thirds comprised of mountain regions of high altitude and cold climate. Because of the vast territory, animal resources are abundant. The snow leopard occurs primarily in Tuole Wild Yak Valley, Muli, and Qilian of Qilianshan Mountain area. It also occurs in Dulan and Tianjun areas of the western part, Golmud and Qumalai, Zhiduo, Chendu, Yushu, Angqian, Zado of the south Bayankala Mountain ranges, and the areas of Guide, Guinan, Xinghai, and Tongde.

Investigations of snow leopard have shown various life requirements in the wild. Activity occurs at night, especially at dawn and at dusk, with a particular movement pattern and a regular home range. Snow leopards prey on herbivorous animals such as blue sheep. They become mature at about 3 to 4 years, estrus and mating is from February to April and the gestation period is 97 to 99 days with 2-3 cubs per litter. Because the snow leopard is a typical wild animal of the mountains it is difficult to raise well in captivity, and today there are only a few zoos in China that breed and exhibit this species. The life-span of the snow leopard is short because of limits to its captive circumstances and other elements. We should conduct further research and development to protect this endangered animal.

CAGE AND FEEDING CONDITIONS

Since 1968 the snow leopard has been reared and exhibited in Xining Zoo. Through many years of success and failure snow leopards have adapted to the circumstances in our zoo and some have lived for more than 13 years. Nine cubs from the wild have been raised to mature adults. On July 13, 1984 a snow leopard first successfully gave birth in Xining Zoo. To manage snow leopard well in captivity it is necessary to create normal circumstances to which they can adapt. Although the snow leopard is a cold-resistant animal, its cage must be exposed to the sun, provide shelter from the wind and prevent sunstroke in summer. Because the snow leopard is a large carnivore its cage should be strong, wide and be convenient for both the caretaker and visitors. The cage size in our zoo is 3 x 2.7 x 3.2 m and the outdoor grounds area is 3.3 x 3.8 x 2.8 m. Both outdoors and indoors there is a perch rack 1.9 m high for snow leopard activities such as jumping, resting and bone chewing. The inside area is of sufficient slope for easy sterilization, cleaning and draining off of water. In winter to prevent freezing of water and food we keep the temperature of the indoor room above 0°C. We also installed an ultraviolet lamp of 330 V in the cage to insure sanitation, sterilization and the general health of the snow leopard.

FOOD AND FEEDING MANAGEMENT

In the wild snow leopards prey on herbivorous animals such as blue sheep and rodents, as well as eating a few plants. Once full it can go without eating for several days. In keeping with its natural diet, we fed the snow leopard in our zoo beef and mutton produced in Qinghai Province, and to enhance its condition we occasionally added live chickens and rabbits and included heart, liver and blood of sheep or cattle with some milk, cod-liver oil, calcium and vitamins. Generally the appetite of snow leopards differs with age and season and we feed it accordingly. We provide an adult with 2 kg meat with bone and 1.5 kg bone once a day at about 1700 hr, with Sunday a fast day. The snow leopard has a good appetite and eats all the food provided in autumn and winter, but during the hot summer its appetite decreases. Food should be closely examined to prevent it becoming moldy, putrid or frozen. The wild snow leopard's favorite food is blue sheep. Once we gave a live 15 kg blue sheep from the Xining Zoo to a female snow leopard. The snow leopard bit the sheep's neck until it died, then pulled it inside and ate. The next morning only the head, four limbs, ribs, stomach, intestine and skin were left, and the skin was very clean and intact.

There are several snow leopards in the zoo with injured limbs received from the traps used when they were captured in the field. Long-distance transportation and sudden changes in circumstance, including shock, appear to cause snow leopards to decrease food intake and some of them eat nothing for the first few days in our zoo. We isolate the recently arrived snow leopards in a house with plentiful sunshine and quiet, treat the injured snow leopards over time and let them gradually adapt to the new feeding circumstances. According to our observations captured adult snow leopards have a strong resistance from the start, for when reared properly they seldom get sick, adapt themselves well to the new circumstances and grow with regular activity. At dawn and at dusk they usually walk about the grounds outside the cage and in daytime they like to rest on a perching rack. During hot days in summer they move less and tend to crouch in dark and cool places, and their food intake decreases.

Feeding of Young Snow Leopard

It is quite difficult to feed young snow leopards in captivity. Since 1978 we have fed nine young snow leopards (age, 2-7 mo.) captured from the field; their feeding regime is given in Table 1. Because of early weaning and a poor nutritional state their hair is unkempt and they have a weak physique. We select an experienced person to feed them and use a cage facing the sun and sheltered from the wind. In winter the temperature inside is kept above 10°C and a sleeping box of 50 x 40 x 50 cm lined with hay is provided for each cub. The cages and food utensils are regularly sterilized and each young is provided with its own food and water basin. We regularly monitor the young snow leopards' growth condition and observe them during feeding time to note their spirits, activity, appetite, digestion, excrement and urine, also making sure the caretaker gives them rations on time.

When feeding 2-7 month-old snow leopard cubs we should take note of the following:

- 1) Milk should be fresh and about 37°C so as to prevent shedding and gastroenteritis disease. Feed and observe the young individually, for diarrhea is easily passed among the cubs.
- 2) Observe during nursing and pay close attention to its expression. As the snow leopard grows, adjust the milk concentration and quantity of meat.
- 3) To assure proper feeding, increase the opportunities for activity. For instance, include a wooden ball in its grounds and let it play and exercise. Make sure the cubs get adequate sunshine or ultraviolet-rays to prevent rickets.
- 4) When the cub is five months old the feeding frequency should be changed from three times to twice a day. At seven months it may be fed once a day with meat and bone, and once a week with live food such as chicken or rabbit and with viscera (heart, liver, lung) of cattle and sheep. When changing diet the food should be changed slowly so as to avoid indigestion. At greater than one year old it should be fasted one day a week. According to our caretaking experience the snow leopard raised in captivity has a gentle disposition. Over a long time of feeding and care the keepers and snow leopards develop a rapport and the keepers can easily touch the snow leopard directly (Figures 1 and 2).

REPRODUCTION OF SNOW LEOPARD

Before 1984 seven cities in China, including Beijing and Shanghai, had zoos exhibiting pairs of young snow leopards (male and female). However, none had solved the problem of reproduction in captivity. Xining Zoo is on the Qinghai-Xizang Plateau at about 2271 m elevation, with a continental climate of the Temperate Zone, an average annual temperature of about 5.5°C, maximum temperatures reaching 31°C in July, minimums reaching -26.6°C in winter, and 2820 hours of strong sunshine a

1. Feeding regime for 2-7 month-old snow leopard cubs.

Age in months	No. feeding times	Milk (g)	Water (ml)	Meat (g)	Ca (g)	Cod-liver oil (d)	Vitamin B (g)	
2	3		100	50	100	1	2	0.2
3	3		120	50	120	1	2	0.2

4	3	150	50	200	1	2	0.2
5	2	250	50	350	1	3	0.4
6	2	250	50	450	1	3	0.4
7	1	200	50	1000	2	4	0.4

year with abundant ultraviolet rays. Such conditions are quite similar to the snow leopard's natural habitat. Xining Zoo thus possesses geographical conditions and climate appropriate for snow leopard reproduction. To enhance our chances for successfully breeding snow leopard we organized a scientific research group and proceeded to increase illumination (both natural and artificial such as infrared and ultraviolet light), rebuilt the cage adding a perch, adjusted the food regime so to make the snow leopard lose weight and induce estrus and mating, and made use of opportunities to close the cage for mating. On April 5, 1984 we enclosed the No. 1 female and No. 5 male in a cage and the two mated many times. The female became pregnant and successfully gave birth 99 days later on July 13, 1984, bearing 3 cubs, of which one died. The two cubs grew well. In July 1985, the female bore two cubs and one died (see Liao et al. 1985, Liao, this symposium).

According to our zoo's records the common illnesses of snow leopard are gastroenteritis, infectious enteritis, cold, pneumonia and internal parasitic infections (mainly roundworm). Infectious enteritis is especially dangerous, with symptoms of vomiting, diarrhea with blood and mucus, loss of appetite or anoxia, protrusive third eyelid, low spirits and a fever of over 40°C. Infectious enteritis breaks out and attacks quickly, especially in young snow leopards because of their weak resistance. Once the disease is diagnosed strict measures should be taken at once to isolate the sick one and treat it with blockage and disinfection. Such treatment includes: a) clyster; using 5% inject glucose 500 ml, choosing the antibiotic according to irritability test, warming up and clystering the snow leopard once a day, b) infusion; using 5% injection glucose 500 ml first, then using 10% injection glucose 500 ml choosing antibiotic and vitamin C by intravenous infusion once a day, c) intramuscular injection; using hemostatic once a day, and d) oral medicine; using antibiotic and vitamins. If this is successful, change treatment to use digestant and vitamins to recover appetite.

During winter and spring snow leopards, especially newcomers and young ones,

FIGURES 1 and 2. Snow leopards with keepers in Xining Zoo.

easily get upper respiratory tract diseases. Therefore, when the weather changes measures should be taken to prevent cold or provide warmth. For sicknesses such as colds and pneumonia, appropriate medicine should be given. Antiparasite treatments should be carried out regularly in spring and autumn. With its strong resistance, adult snow leopard symptoms do not appear clearly and obviously at initial stages of sickness. Careful observation and early treatment are essential. Besides treatment according to symptoms, sick animals need nursing, but the most important thing is to take measures to prevent disease. In accordance with regulations of our zoo, only after isolation, feeding, observation and physical examination can the newcomer be enclosed with other snow leopards.

With a weak resistance in captivity, the disease rate of young snow leopards is high in those less than one year old. Digestive diseases are caused by change in food, polluted food and drinking water, and sudden changes in the weather. If diarrhea is found caused by indigestion during feeding (feces grayish white with undigested meat), then besides normal treatment reduce food quantity to 1/2 or complete fasting so as to relieve the digestive system and let it recover gradually. Some feeding with a little fresh and cooked mutton is also advisable.

DISCUSSION

According to our preliminary experiences with the care and breeding of snow leopards in Xining Zoo, we think the animal quarters, food condition and rearing method are the most important basic elements for insuring normal growth. The snow leopard is a high mountain wild animal and to breed in

captive circumstances one must take into account its dislike of strong sunshine in the hot summer. In low elevation areas air conditioning and other temperature lowering installations should be set in the cage of snow leopard. Quality of food, sanitation and hygiene during feeding, maintaining the feeding schedule (especially for cubs) and provision of proper live food such as chicken and rabbit are all important. Take measures to structure feeding management and the cleaning and disinfection of indoor and outdoor cages. Disease prevention is better than cure. To improve the animal's health we carry out regular preventative measures to rid it of parasites each year. With the agreement of national wildlife management agencies we make every effort to breed snow leopard so as to make an active contribution to snow leopard protection and population in zoos.

The above experiences outline our initial observations on snow leopard breeding and management in Xining Zoo. It is just the beginning and we will continue to take further steps in breeding and management of snow leopard.

REFERENCE

Liao Yanfa, Luo Huanwen et al. 1985. A preliminary study on the rearing and breeding of ounce. *Acta Theriologica Sinica* 5 (3).