

2005 Giant Panda Breeding Proposal (Taipei City Zoo)

1) The animals:

The animals will come from the China Conservation and Research Center for the Giant Panda in Wolong, Sichuan.

2) Transportation:

1. Obtain a permit for export and import according to regulation.
2. Add Vit.E 500IU to feed daily for one month prior to transportation.
3. Select a cool season between the end of autumn and the start of spring for transportation.
4. Use a cage of stainless steel bars of dimensions H.1.7m * 1.2m * W1.2m (in order to obtain permit, top, bottom, left and right will be closed, front and back will be iron railings).
5. Following inspection by customs at Chiang Kai-shek Airport, Taoyuan, it will be put onto a truck laid with waterproof plastic sheets, taken to the panda house at Taipei City Zoo, released immediately into the pen, and quarantine will begin.
6. Throughout transportation they will be attended to by panda breeding experts from the gifting organization, as well as breeding staff and veterinary surgeons from the Chinese zoos.

3) Breeding Site:

1. Site: see attached diagram of panda house.
2. Facilities: see attached diagram for plane view of panda house.
 1. Indoor display house (1) 254.57m²
 2. Indoor display house (2) 210.87m²
 3. Bamboo store 28.18m²
 4. Catering room 19.70 m²
 5. Indoor living room (1) 28.66m²
 6. Passageway and short stay area 17.17m²
 7. Indoor living room (3) 53.73m²
 8. Indoor living room (2) 21.26 m²
 9. Maternity Room 6.18 m²
 10. Outdoor playground 109.60 m²
 11. Outdoor life display area 495.36 m²

3. Matters for explanation:

1. Summer indoor temperature 18-25°C, humidity 60-70% (manual control); outdoor temperature 20-35°C, humidity 60-80% (manual control).
Winter indoor temperature 9-18°C, humidity 60-70% (manual control); indoor temperature 17-25°C, humidity 60-90% (manual control).
2. Part of the bedroom floor will be laid with ceramic tiles, whereas the maternity room will have wooden surfaces. There will also be a urine collection trough, for the purpose of collection and examination of urine.
3. Grass will grow in the playground and display house, which will also contain a pool and facilities for climbing and providing shade, as well as extensive plant beautification and greening.
4. The temperature and humidity of the whole house will be regulated and controlled by a central air conditioning system, and closed-circuit monitoring and weight measuring

equipment will be installed.

5. An automatic power generator should be installed in the panda house in order to cope with power cuts, and in the event of the water supply being cut off special trucks will be hired to bring supplies of tap water.

4) Feed:

1. Continue to use the formula used by the gifting organization, (see Literature Review¹).
2. Reserve formula: table 31.

bamboo	15kg	
rice porridge	0.8kg	200g rice, 300g ground corn, 50g milk powder, 50g sugar (mixed with up to 4kg, then boiled dry down to 0.8kg).
eggs	1-2	
steamed cake	0.8kg	67% cornflour, 30% soybean powder, 2% bone meal, 1% salt, one spoon of multivitamins and one spoon of multi-minerals.
sugar cane	1kg	
apples	0.5kg	
carrots	0.2kg	
bananas	2	
beef or chicken	200g	per week
bamboo shoots	2kg	
primate family	0.3kg	
vitamin E	300 units	

3. Supply of fresh bamboo feed for the giant pandas.

1. Sources:

1. Outsourcing: To supply at least five types of bamboo eaten by pandas as a staple (discuss and decide on types of bamboo with the gifting organization).
2. Contracted public land: Plant at least ten varieties of bamboo mainly on contracted public land within one hour's drive from the zoo. After a cultivation period of a year or more this can be harvested.

2. Schedule for bamboo feed supply:

1. From the day of the pandas' arrival until the end of December 2007: mostly outsourcing.
2. From January 2008: Start to include in the supply the ten or so varieties of bamboo grown on the contracted public land. The proportion of bamboo feed that this will account for will, depending on the planting circumstances, rise from 30% to 60%; the

¹ Not publicized.

remainder will be outsourced.

3. Preparation:

1. Gather records of edible bamboo varieties.
2. Send a bamboo expert and the Zoo nutritionist to China to confirm with panda experts the varieties of bamboo to be cultivated in Taiwan.
3. Decide on possible places from which to purchase bamboo, and carry out comparisons of the nutritional value of the various species and analysis of heavy metals and toxins.
4. Carry out tests for palatability of Taiwanese bamboo varieties.

5) Raising and Breeding Management

1. Managers should carry out all breeding and management work according to the rules of the Zoo's management handbook.
2. The Zoo will revise the management procedure according to the views and suggestions of the gifting organization.
3. For management before and after birth, see *Giant panda breeding research* (Chang Ho-min et al., 2002), *Giant panda reproductive physiology and artificial breeding* (Feng Wun-he, 1987) and the artificial breeding and nursing of the giant panda section of the Literature Review.
4. Consult *Selected research papers on treatment of giant panda diseases* (China Wildlife Conservation Association, 1987).
5. Consult the import standards of The American Zoo and Aquarium Association (AZA).

6) Breeding research

1. Breeding research proposal.

1. Objective: To insure and improve the nutrition, health and normal growth of giant pandas.
2. Method:
 - (1) Weigh the food fed to them and that left over on a daily basis in order to obtain information about their appetite.
 - (2) Analyse the nutritional value of the feed (including protein, fat, carbohydrates, fibre) four times a year and compare the nutritional value of the dwarf bamboo and other bamboo grown inside and outside of the Zoo.
 - (3) When altering the feed formula, analysis of the nutritional value of the food should also be carried out.
 - (4) Four times a year, for a period of a week, collect feces and, after freeze-drying, carry out digestibility tests.
 - (5) Carry out annual analysis of information regarding the pandas' appetite, nutrient assimilability, digestion rate, and growth.
 - (6) Research artificial nursing techniques.
 - (7) Regularly analyse the nutritional value of, and check for toxins in, bamboo and bamboo shoots produced in Taiwan.
 - (8) Research and develop substitute milk powder.
3. Responsible persons: Lin Hua-cing, Cao Sian-shao, Yang Si-wun, Chen Jhih-ting.
4. Lead experts: Dr. Chen Bao-ji, Dr. Yang Cing-bai and Dr. Lin Mei-fong.
5. Period: January 2006 to December 2010, altogether five years.
6. Budget: NT\$5 million a year * 5 years, altogether NT\$25 million.

2. Behavioural research proposal.

1. Objectives: To understand the daily behavioural patterns and reproductive, nursing,

aggressive and other social behaviour of the giant panda in the Taipei City environment, and to examine the meanings of their calls, to provide reference materials on outdoor management of giant pandas.

2. Method:

- (1) Management staff will observe and record animal behaviour for five minutes every hour.
- (2) 24 hour video recording will be carried out, to be browsed through the following day.
- (3) Observe according to methods focusing on behaviour and focusing on the animal.
- (4) Record the frequency of animal calls.
- (5) Carry out annual statistical analysis of the animals' daily behavioural patterns, investigation of all behaviour, and analysis of the meanings of their calls.

3. Responsible persons: Lin Hua-ting, Cao Sian-shao, Gao Shao-wun, Chen Jih-ting.

4. Lead experts: Dr. Wang-Yin, Dr. Li Shou-sian, Dr. Yu Hong-can and Dr. Jhu You-tian.

5. Period: January 2006 to December 2010, altogether 5 years.

6. Budget: NT\$1 million a year * 10 years, altogether NT\$10 million.

3. Disease prevention and treatment and pathology research proposal.

1. Objective: Carry out animal training, and collect specimens according to the annual panda preventative medicine plan, in order to understand the state of health of the pandas, thus helping to maintain their health and diagnose diseases, and carry out disease prevention and treatment.

2. Method:

- (1) Carry out animal training, and collect specimens according to the annual panda preventative medicine plan, measure external form and substance, anal temperature, respiration rate and pulse.
- (2) Test feces for parasitic ova every two weeks.
- (3) Collect and sort information relating to cases of disease in pandas as reference for diagnostic research.
- (4) Carry out annual research of the growth and shrinking of parasites and examine methods for prevention and cure.

3. Responsible persons: Jin Shih-cian, Kuo Jun-cheng, Chen Jih-ting and Yu Jhen-fang.

4. Lead experts: Dr. Liou Jhen-syuan, Dr. Pan Ming-Jheng, Dr. Li Jhao-hua and Dr. Pang-fei.

5. Period: January 2006 to December 2010, altogether 5 years.

6. Budget: NT\$1 million a year * 5 years, altogether NT\$5 million.

4. Reproductive research proposal.

1. Objectives: Research the reproductive physiology and techniques of the giant panda in order to increase effectiveness of panda reproduction and avert its extinction.

2. Method:

- (1) Investigate the reproductive physiology of the animals through observation of their reproductive behaviour.
- (2) Collect feces and urine annually every week from March to May, and test for hormone content using radioimmunoassay (RIA) and enzyme immunoassay (EIA) in order to diagnose sexual activity and pregnancy.

- (3) Carry out artificial sperm extraction and sperm freezing (Feng Wun-Jhih, 1988).
 - (4) Check the sperm characteristics.
 - (5) Carry out artificial insemination (Masui, 1989).
 - (6) Analyse records of reproductive physiology on an annual basis and examine all reproductive techniques.
3. Responsible persons: Yang Jian-ren, Zhao Ming-jie, Lin Hua-cing and Jin Shih-cian.
 4. Lead experts: Dr. Lin Ren-shou, Dr. Jheng Deng-guei, Dr. Wu Liang-sin and Dr. Wang Pei-hua.
 5. Period: January 2006 to December 2010, altogether 5 years.
 6. Budget: NT\$2 million a year * 5 years, altogether NT\$10 million.
5. Extension education and interpretation proposal.
 1. Objectives: Through the use of various kinds of interpretation facilities, activities and publications, facilitate the public's understanding of the relationship between humans and panda ecology, behaviour, origins, evolution and environment, and raise awareness regarding the protection of pandas and animals native to Taiwan.
 2. Method:
 - (1) Create a set of giant panda interpretation facilities in the panda house, and show slides and films.
 - (2) Publish a series of books, handbooks, study cards and posters about the giant panda.
 - (3) Hold various kinds of activities related to the giant panda.
 3. Responsible persons: Yang Chong-sian, Syu Yu-ling.
 4. Lead experts: Dr. Yang Ping-shih, Dr. Jhuh Fong-gang, Dr. Zhou Ru, Dr. Chen Pei-Jheng, Dr. Lin Ru-sen and Dr. Lyu Guang-yang.
 5. Period: January 2006 to December 2010, altogether 5 years.
 6. Budget: NT\$1 million a year * 5 years, altogether NT\$5 million.

7) Other management matters

1. After the two pandas arrive in Taiwan, enter them immediately into the giant panda pedigree certificate, and subsequently provide records of the breeding of the pandas at the Zoo. Take part in the International Panda Breeding Plan.
2. Send staff to attend the biannual international meetings on giant panda conservation, to submit papers reporting on the breeding situation of the giant pandas at the Zoo, and offer our experience to the participants.
3. After they arrive, there will be absolutely no release, slaughter, transfer of ownership or sale of the animals, nor will they be hired out for display.
4. Should an animal die, an examination report and autopsy report giving a detailed explanation of the cause of death will be issued, and the corpse will be turned into a specimen display.
5. If breeding is successful, the surplus animals will be offered to Chinese and other zoos for breeding purposes, or some of the offspring will be put into giant panda conservation areas in China for breeding.

8) Establishment of an animal conservation fund

After the pandas have arrived in Taiwan, funds will be raised from industry and commerce and the public, with which an animal conservation fund will be established. 30% of the conservation funds will be given to the international fund for saving the giant panda, 40% will go towards a fund for the breeding management and reproduction research for the two pandas, and 30% will go towards

a fund for wildlife conservation, education and research in Taiwan. Foundations will be established for all funds to manage their custody and use.

9) Management and training staff

1. Zoo...(list of names).
2. Local group of experts... (list of names).
3. Research, study and training plan.

Before October 2005, appoint an advance team to visit the panda conservation bases and zoos in various parts of China, America and Japan to receive one month of practical training in breeding management and medical treatment. During August to September of next year, a month before the animals are imported, designate relevant staff members to carry out on-site participation in research and study of the breeding management and medical treatment of the specific animals in restraint.

10) Schedule

1. Construction of the panda house

(September 2005 – September 2006)

9	10	11	12	1	2	3	4	5	6	7	8	9
Contract signing underway								Construction completed	Donation		Opening	

2. Personnel training

9	10	11	12	1	2	3	4	5	6	7	8	9
Make		Training						specific animals, breeding		Research and study of the Contact management and medical treatment in restraint.		

3. Importing the animals

9	10	11	12	1	2	3	4	5	6	7	8	9
Handle all formalities			Confirm and		site		Import individuals		Animals enter display		import of the quarantine	

11) Budgetary estimate

1. Construction of the panda house (including hardware, central air conditioning system, control systems and interpretation facilities): funds donated by the Shin-Kong Group.
2. Transportation costs: (including transportation boxes, shipping fees, fees for experts hired to

look after the animals throughout transportation): it is the intention that these will be sponsored by airline and transportation companies.

3. Internships and on-the-job training, animal research, medical expenses, education and interpretation, cooperation fees and personnel costs will total NT\$18.68 million.

12) Sources of funding

1. Commercial donations: carry out fund raising according to the position paper and the proposal on fund-raising, with a target of NT\$10 million.
2. Panda conservation collection boxes for tourists: install panda conservation education and interpretation equipment and collection boxes in the panda house queuing area, giving an explanation of how the funds will be used; estimated contributions: NT\$10 million.
3. Develop and sell souvenirs: if the giant pandas are displayed in the zoo, soft toys and other kinds of merchandise can be developed, with 50% of the profits going into a special account for the pandas. With an estimated 4 million visitors to the panda house, each spending an average of NT\$15, a surplus profit of 30% would be $4,000,000 \times 15 \times 30\% = \text{NT\$18 million}$, with an estimated NT\$9 million being donated to the animal conservation funds.
4. Having established the panda conservation fund, the funds will first and foremost go towards breeding management and reproductive research of the two pandas, while the 30% surplus will go towards the fund for wildlife conservation, education and research in Taiwan.