



# GIANT PANDA NUTRITION

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## Giant Pandas - One Of The Animal Kingdoms Most Fussy Eaters

In the wild, a giant panda's diet is 99% bamboo. The other 1% consists of other grasses/herbs and occasionally small prey animals. At the Toronto Zoo, the giant pandas will be fed a diet that consists of fresh bamboo, leaf eater biscuits, apples, and occasionally sugar cane or icicles as a treat. Fresh bamboo will be 80 – 90% of the giant panda's diet and they will be offered between 42 to 64 kilograms (93 to 141 pounds) of bamboo each day. A giant panda's digestive system is more similar to that of a carnivore than a herbivore, and therefore most of the bamboo goes undigested, passing quickly through the digestive tract (giant pandas relieve themselves dozens of times a day). To make up for eating rather indigestible food, a giant panda needs to consume a comparatively large amount of it in order to extract enough nutrients. In order to obtain this, a giant panda must spend 10 to 16 hours a day foraging and eating. The rest of the time they spend mostly sleeping and resting. Approximately 600 to 900 kilograms (1,322 to 1,984 pounds) of fresh bamboo will be delivered to the Toronto Zoo's Giant Panda Experience per week and stored in cold storage refrigerators.

## Interesting Facts About Bamboo

Giant pandas can eat more than 25 different types of bamboo, but they usually eat only the four or five that grow in their home range. The unusual thing about bamboo is that all of the plants of one species growing in an area will all bloom together at once every 30-80 years and after that they will all die at the same time. When this happens, giant pandas move to another area with palatable bamboo. Now, with humans taking up much of the giant panda's habitat, giant pandas are often unable to move to another area and may face starvation.

## Adaptations

Giant pandas have developed unique adaptations, related to having lived in the bamboo forests for millions of years. They eat a diet of bamboo, which has a very low nutrient density. They can live off of bamboo because they eat so much of it (10 to 15 kilograms ingested per day)! To do so effectively, they have to be very selective to choose only the best bamboo. We do not know how giant pandas select bamboo, but we think that they can smell and taste what is best for them. At Toronto Zoo they are offered enough fresh bamboo per day to enable them to choose what they like.



- 2 -

The giant panda's molars and premolar teeth are wider and flatter than those of other bears and are suitable for a diet of bamboo. These teeth and their strong jaws and powerful jaw muscles allow giant pandas to crush and grind the tough, fibrous bamboo. Their digestive system is lined with extra layers of protective tissue and it has lots of mucus to protect against sharp bamboo splinters. An extra opposable digit (thumb) on the front paw is actually a modified sesamoid (wrist) bone that enables the giant panda to dexterously grasp bamboo stalks. The black and white markings on giant pandas have helped them to blend into their snowy and rocky surroundings to avoid natural predators. Giant pandas do not hibernate, but will shelter temporarily in hollow trees, rock crevices and caves during the winter.

### **What to do about Bamboo?**

The nutrition of giant pandas is very unique and exotic and is a great example of nutritional specialization! At the Zoo's Wildlife Nutrition Centre we are very excited to have tremendous support from Memphis Zoo, who supplies the Toronto Zoo with bamboo, and where we learned a lot about giant pandas and bamboo.

Toronto Zoo Nutritionist, Jaap Wensvoort, travelled to Memphis Zoo in December 2012 and January 2013 to arrange for the important details on the bamboo harvest, packaging and the transportation to Toronto Zoo by FedEx, as well as learn more about giant panda nutrition research. Memphis Zoo has an excellent reputation for their bamboo nutrition research and is by far the most knowledgeable on giant panda nutrition in North America.

At the Memphis Zoo bamboo plantation the bamboo is harvested and prepared into bundles, packed and sealed in plastic sleeves (to avoid moisture loss), and kept at low temperature. It will then be cared for and transported by FedEx and it can arrive at Toronto Zoo as quickly as the same day it was harvested! The bamboo will be shipped two to three times per week to the Toronto Zoo Giant Panda Experience's own personal "Bamboo Cooler" that has been engineered to keep fresh bamboo at its best. We even measure the temperatures of the bamboo during transport with the latest temperature loggers provided by FedEx – how 'cool' is that!



- 3 -

We have a minimum of four different bamboo species available for Er Shun & Da Mao to enjoy, all of which are accepted by giant pandas in other North American Zoo facilities. The species of bamboo consist of: *Phyllostachys glauca*, *P. Aurea*, *P. rubromarginata* and *P. aureosulcata*. Feeding the giant pandas and their nutrition is a of great importance, as a result there will be daily coordination with Toronto Zoo's giant panda keepers, nutritionists and the harvesters of bamboo in Memphis on which bamboo to supply and how much. Initially (and opportunistically) it is the Toronto Zoo's goal to try and include significant amounts of bamboo shoots in the bamboo bundles. Bamboo shoots are considered to be the yummiest part of the bamboo (if you are a giant panda!) Toronto Zoo Nutritionists are currently coordinating to send some of our supplemental feed to China, for Er Shun & Da Mao to be introduced to the taste of Canadian chow... or should we say cuisine?

### **Hamilton Bamboo Popular with Toronto Zoo's Picky Pandas**

We are pleased to announce that the Memphis Zoo was not our only source of bamboo for 2013. "McMaster University has been growing golden bamboo in its campus greenhouse for about 10 years as part of its biology program. Until now, the excess bamboo has always ended up in the compost. When the Toronto Zoo announced it was bringing in two giant pandas in March — 6-year-old Er Shun and 5-year-old Da Mao — McMaster's greenhouse manager Arthur Yeas asked if they'd be interested in taking some of his harvest" (Toronto Star, September 2013). "In case we have an emergency we can, hopefully, jump in the car and go there . . . that's so handy for us. It's a lifesaver for us" (Japp Wensvoort, Nutritionist – Wildlife Care)

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